In presenting the dissertation as a partial fulfillment of the requirements for an advanced degree from the Georgia Institute of Technology, I agree that the Library of the Institution shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to copy from, or to publish from, this dissertation may be granted by the professor under whose direction it was written, or, in his absence, by the Dean of the Graduate Division when such copying or publication is solely for scholarly purposes and does not involve potential financial gain. It is understood that any copying from, or publication of, this dissertation which involves potential gain will not be allowed without written permission.

_____

_____

SYNTHESIS OF THE FOUR-BAR LINKAGE

A THESIS

Presented to
the Faculty of the Graduate Division

by

Harold Lee Johnson

In Partial Fulfillment
of the Requirements for the Degree
Master of Science in Mechanical Engineering

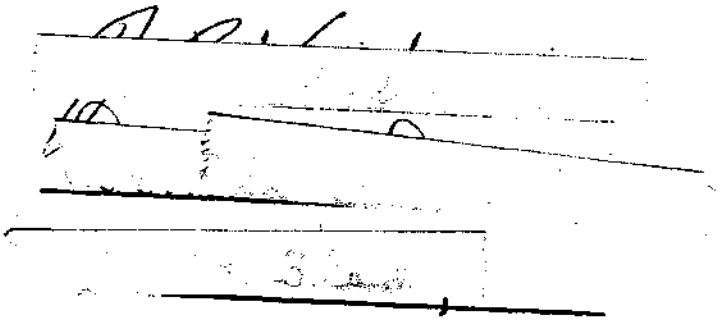
Georgia Institute of Technology

June, 1958

3 A
12 T

SYNTHESIS OF THE 4-BAR LINKAGE

APPROVED:



Date Approved by Chairman: May 30, 1958

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	iii
LIST OF ILLUSTRATIONS	iv
SUMMARY	v
GLOSSARY	vii
CHAPTER	
I. HISTORY OF LINKAGE MECHANISMS WITH PARTICULAR REGARD TO SYNTHESIS	1
II. PLAN OF THE INVESTIGATION	5
III. MATHEMATICAL DEVELOPMENT	7
IV. SCOPE AND FORM OF DATA	12
V. HOW TO USE THE DATA AND CURVES FOR DESIGN PURPOSES	14
APPENDIX	18
MACHINE PROGRAM	19
DATA AND CURVES	29
BIBLIOGRAPHY	322

ACKNOWLEDGEMENTS

On the completion of this investigation I wish to express my sincere thanks to Dr. R. L. Sweigert, Dean of the Graduate Division, to Dr. K. M. Murphy, Associate Professor of the English Department, to the Georgia Tech Computer Center, to Dr. J. P. Vidosic, my thesis advisor, to Dr. M. B. Sledd, Director of the School of Mathematics and to Professor D. W. Dutton, Director of the Daniel Guggenheim School of Aeronautics, for making possible and for aiding me in the pursuance of this research.

LIST OF TABLES

Page

TABLE

I. Simultaneous X and Y Values for the Function y = xcos x 15

II. Normalized Values of X and Y for the Function y = x cos x 16

LIST OF ILLUSTRATIONS

Figure		Page
1.	Crank and Rocker Type 4-Bar Linkage	7
2.	Pythagorean Relations Defining Angles $\pi - \alpha_1$, $2\pi - \alpha_2$, β_1 and β_2	8
3.	Crank and Rocker Type 4-Bar Linkage Illustrating Mathematical Development of Formulae	10
4.	Typical 4-Bar Linkage Follower Motion Illustrated by the Trace-Deviation Method	13
5.	Use of 4-Bar Linkage for Function Generation	17

SUMMARY

For the purpose of providing a catalogue of representative curves, with accompanying data, for the designer's use in synthesizing a mechanism, a study of the behavior of the follower link in a crank and rocker type 4-bar linkage during 360 degree rotation of the crank was conducted and is here presented.

The difficulty of synthesis is shown by a brief history of linkage work. Next, a mathematical development is given, which provides a method of determining analytically the relative positions of crank and follower in a 4-bar linkage. Then the use of the curves and data for design is explained.

From this study were compiled curves and data which represent the follower motions of 146 4-bar linkages of the crank and rocker type. Linkage ratios identify each mechanism analyzed.

The curves and data are in the form of the trace and deviation representation, a method which denotes the normalized motion of a machine member. Normalization means simply the representation of the machine member's displacement as a fractional part of its total displacement range. A constant motion would indicate 0.1 normalized displacement for 0.1 actual displacement. This condition was characteristic of the crank throughout the present study, since a constant angular rotation was chosen for the crank. On the other hand, for the wide variety of ratios of

linkages of crank and rocker type, namely 146, that were studied, the follower link exhibited acceleration and deceleration characteristics with only small periods of constant motion.

For the mechanism designer who is interested in the possible use of computers for solution of linkage problems, a machine program including flow chart and machine orders appears in the appendix of this report. The included machine program was used to solve the algebraic and trigonometric expressions relating the motion of the follower link compared to the crank input motion.

GLOSSARY

A	Relative length of a 4-bar linkage coupler in comparison to the crank.
B	Relative length of a 4-bar linkage follower in comparison to the crank.
C	Relative length of the frame part of a 4-bar linkage in comparison to the crank.
α	Crank angle measured clockwise from left end of X-axis.
β	Follower angle measured clockwise from left end of X-axis.
D	Deviation of follower's travel compared to constant motion of crank.
K	$\sqrt{1+B^2+C^2-A^2}$
L	Normalized travel of the crank.
m	Imaginary link connecting pin joints 1A and BC.
O_1	Pivot center for crank.
O_2	Pivot center for follower.
R_C	Range of crank between crank positions which produce leftmost and rightmost positions of follower.
R_F	Range of follower between leftmost and rightmost positions.
XN	Normalized displacement of crank.
YN	Normalized displacement of follower.
θ	Angle formed by imaginary link m and frame link C.
ϕ	Angle formed by imaginary link m and follower link B.

CHAPTER I

HISTORY OF LINKAGE MECHANISMS WITH PARTICULAR REGARD TO SYNTHESIS

In the design of computing mechanisms it is often desired to generate arbitrary functions in which the variables are represented by an analogous quantity such as a shaft rotation. In recent times, consideration has been given to the use of 4-bar linkages for function generation.

Linkages are light, inexpensive, adaptable to high speeds and comparatively friction-free. They are, therefore, efficient for the purpose stated hereafter. Unfortunately, however, they are very difficult to synthesize. "Synthesis" (the antonym for "analysis") implies the combination of parts to produce a complex whole. "Kinematic synthesis" may be defined as the determination of the type and principal dimensions of the parts necessary to a device that is to convert one specified motion into another. The method most commonly used in the past has been a type of graphical solution based on trial and error which usually retains some error. Analytical methods, as well, have been devised, but the majority of these (with the possible exception of the method of B. W. Schaffer and I. Cochin (1)*) are so lengthy and laborious that the end results hardly justify the means. Schaffer's and Cochin's analytical approach to synthesis employs the use of parameters x, y, z, where x is the cosine

*Numbers in parentheses refer to items in Bibliography.

function of the crank angle of a 4-bar linkage, y the cosine function of the follower link angle, and z the cosine function of the double angle, follower angle minus crank angle. The authors have developed a compatibility equation, involving multiple derivatives of the parametric expressions, into which it is possible to insert the given function and determine beforehand whether or not a 4-bar linkage can be designed to describe the function.

A literature search for methods of synthesizing the 4-bar linkage was conducted, and although not exhaustive, it did encompass a wide range of works of both authors and private companies. The search was primarily for a certain type of synthesizing data, namely for trace and deviation curves plotted on a unit square, illustrating the behavior of linkages with varying ratios of link dimensions. Svoboda appears to have been the first author to contribute a method of so measuring output against input for the 4-bar linkage (2). His volume, published in 1948, is titled Computing Mechanisms and Linkages.

In Ferdinand Freudenstein's paper, "Approximate Synthesis of 4-bar Linkages" which was presented at the ASME Fall meeting of 1954, mention is made of function generation by use of bar linkages (3). "A successful design procedure must combine the predominantly analytical considerations of linkage synthesis with practical considerations involving mechanical advantages, ranges, dead-center positions, friction and backlash." The large number of variables occurring in the synthesis of a 4-bar linkage and the complexity of their interaction render an analytical approach difficult. Freudenstein's paper, however, presents analytical methods and

points out the desirability of function generation by use of 4-bar linkages. However, other reference material on this subject is quite scarce.

One other paper presented at the 1954 Fall meeting of the ASME was "A Semigraphical Solution of Acceleration Problems of Plane Cam-Driven Roller Followers and 4-Bar Linkages" by Chan Hung Chiang of the Taiwan University, Taipei, Taiwan, Formosa (4). Although the 4-bar linkage figured prominently in the discussion in this paper, no concise method of synthesis was shown.

The next reference consulted was the work by Paul Grodzinski and Professor Ewen McEwen, Link Mechanisms in Modern Kinematics. "Link Mechanisms, consisting of substantially rigid members connected by simple turning or sliding pairs, are not only the simplest and oldest type of mechanisms but are fundamental to any more complex machine. They have, therefore, always been studied to some extent in all mechanical engineering courses." (5) The authors then state that the English-speaking countries have lagged far behind such countries as Germany and Russia in making contributions to mechanism work. Some of these new developments are unknown to the English-speaking countries — partly because of the language barrier.

It is true that in spite of the apparently elementary nature of the linkages, their synthesis for specific purpose is by no means easy, and that, although they are the oldest mechanisms, they still offer much room for improvement.

"Mechanisms are used to convert one motion into another. They may change the force and speed or direction, cause motion in a prescribed path, turn continuous into intermittent motion, turn rotation into recip-

rocation, or store energy for later release." (5) This statement shows how important synthesis can be, but still there is no easy way to accomplish it.

Linkages date back as far as Archimedes' time; and the notes of Besson (1582) and de Cans (1615) refer to them. Lanz and Betancourt in 1808 made attempts at link classification by means of relative motion of input and output.

It is interesting to note the paper by Mr. Allen C. Dunk, Instructor of Mechanical Engineering at Purdue University, published in the February 1955 issue of Machine Design (6). His development was that of a function generator for mechanically drawing curves of required functions. This may very well prove to be the quickest known method for synthesizing the 4-bar linkage, since it requires only an adjustment of arm length to change the character of the resulting curve.

While working for General Precision Laboratory of New York, Mr. Robert L. Kenngott began what he termed an atlas of 27 families of curves, classifying the 4-bar linkage functions (7). To date this work is not complete. Mr. Kenngott gave eight examples of the 4-bar linkage with specifications and illustrations of each (7):

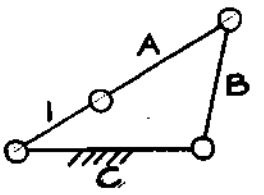
1. Class a - Crank and Rocker
2. Class b - Rotating Connecting Rod
3. Class c - Inverse Crank and Rocker
4. Class d - Drag Link
5. Class A - Right-side Rockers
6. Class B - Outside Rockers
7. Class C - Left-side Rockers
8. Class D - Inside Rockers

CHAPTER II

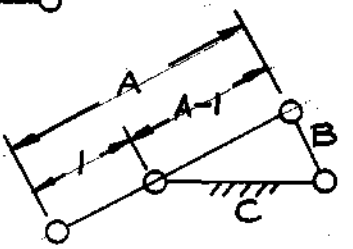
PLAN OF THE INVESTIGATION

The relative dimensions of the links determine the type of motion the 4-bar linkage will display. The eight classes listed in the preceding chapter will each give a characteristic motion unlike any of the other seven. It was decided in this investigation to use Mr. R. L. Kenngott's classification of linkages, since his work in many respects paralleled that of the present study. The development to follow has been built around Class "a" examples only, and in particular, examples as given in Hrone's and Nelson's Analysis of the 4-Bar Linkage, a volume which contains 146 mechanisms of the Class "a" type (8). This Volume gives limit dimensions for A-B-C (Figure 1). For a linkage to be classified as "crank and rocker" it must be true that

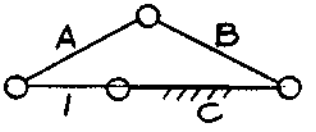
1. $1 + A < B + C$



2. $1 + B < A + C$



3. $1 + C < A + B$



The representation in the present study of the relative link motions, however, is of the form of the trace-deviation square and not a plot of true angle of output versus true angle of input, which method Mr. Kenngott used to illustrate relative link motion.

Further, Mr. Kenngott's curves represent the maximum and minimum limits of the restrictive link, whereas this report will give distinct ratios to the links for each curve shown. Not only will the designer be able to see a curve with limits into which his design will fall, but he will be able to pick a corresponding set of ratios of link dimensions, and examination of the accompanying data will give clues regarding acceleration.

CHAPTER III

MATHEMATICAL DEVELOPMENT

Reference is made to Figure 1, which illustrates the 4-Bar Linkage:

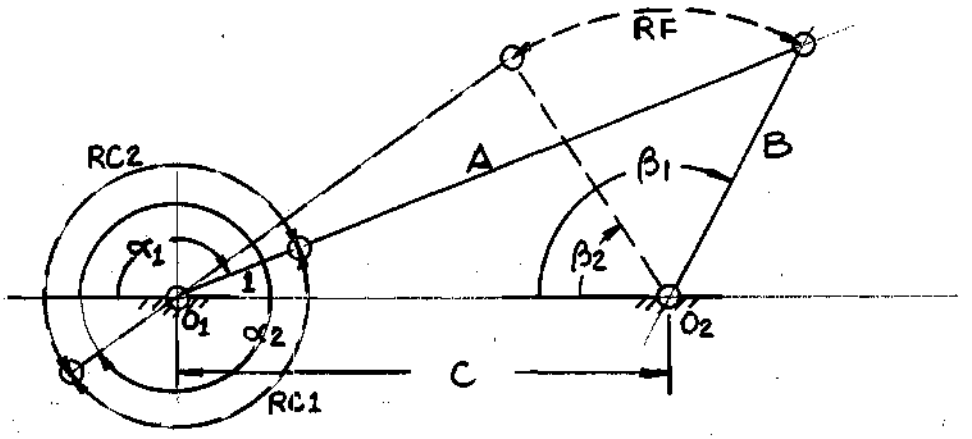


Figure 1

CRANK AND ROCKER TYPE 4-BAR LINKAGE

The crank range, RC1, is equal to $\alpha_2 - \alpha_1$; RC2 is equal to 2π - RC1; and the follower range, RF, is equal to $\beta_1 - \beta_2$. Angles α_1 and β_1 define the rightmost linkage position, or a position of zero velocity for the follower link. Likewise, angles α_2 and β_2 define the leftmost linkage position, where again the follower has zero velocity.

The following is a development of formulae for determination of α_1, α_2, β_1 and β_2:

by the law of cosines

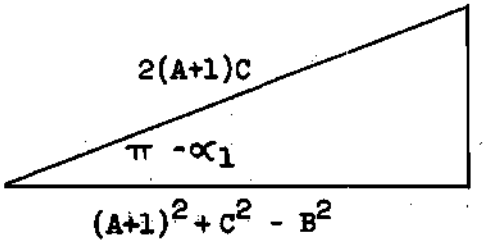
$$\cos\left[\pi - \alpha_1\right] = \frac{(A+1)^2 + C^2 - B^2}{2(A+1)C} \qquad \text{(a)}$$

$$\cos\left[2\pi - \alpha_2\right] = \frac{(A-1)^2 + C^2 - B^2}{2(A-1)C} \qquad \text{(b)}$$

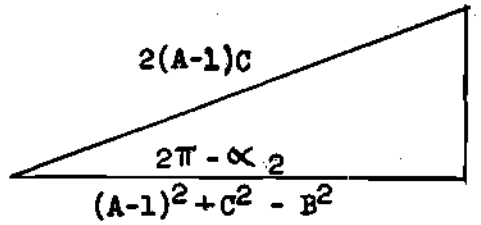
$$\cos \beta_1 = \frac{B^2 + C^2 - (A+1)^2}{2\,BC} \qquad (c)$$

$$\cos \beta_2 = \frac{B^2 + C^2 - (A-1)^2}{2\,BC} \qquad (d)$$

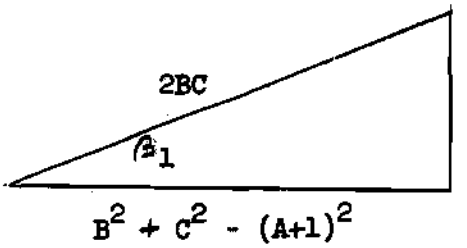
From expressions (a), (b), (c) and (d), the Pythagorean relations shown in Figure 2 may be constructed:



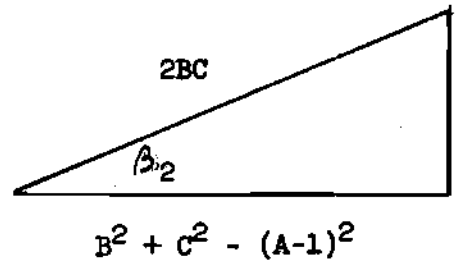
$$\sqrt{4(A+1)^2C^2 - \left[(A+1)^2 + C^2 - B^2\right]^2} \qquad (a)$$



$$\sqrt{4(A-1)^2C^2 - \left[(A-1)^2 + C^2 - B^2\right]^2} \qquad (b)$$



$$\sqrt{4\,B^2C^2 - \left[B^2 + C^2 - (A+1)^2\right]^2} \qquad (c)$$



$$\sqrt{4\,B^2C^2 - \left[B^2 + C^2 - (A-1)^2\right]^2} \qquad (d)$$

Figure 2

PYTHAGOREAN RELATIONS DEFINING ANGLES $\pi - \alpha_1$, $2\pi - \alpha_2$, β_1 and β_2

Now, referring to Figure 2, it is seen that

$$\pi - \alpha_1 = \tan^{-1} \frac{\sqrt{4(A+1)^2C^2 - \left[(A+1)^2 + C^2 - B^2\right]^2}}{(A+1)^2 + C^2 - B^2} \qquad (e)$$

$$2\pi - \alpha_2 = \tan^{-1} \frac{\sqrt{4(A-1)^2C^2 - \left[(A-1)^2 + C^2 - B^2\right]^2}}{(A-1)^2 + C^2 - B^2} \qquad (f)$$

$$\beta_1 = \tan^{-1} \frac{\sqrt{4B^2C^2 - \left[B^2 + C^2 - (A+1)^2\right]^2}}{B^2 + C^2 - (A\ 1)^2} \qquad (g)$$

$$\beta_2 = \tan^{-1} \frac{\sqrt{4B^2C^2 - \left[B^2 + C^2 - (A-1)^2\right]^2}}{B^2 + C^2 - (A-1)^2} \qquad (h)$$

For any simultaneous values of A, B and C such that

1. $1 + A < B + C$
2. $1 + B < A + C$
3. $1 + C < A + B$

the equations (e) through (h) may be used to determine α_1, α_2, β_1, and β_2.

This paper will present data obtained from investigation of 146 combinations of A, B and C with curves illustrating the behavior of the follower link during its cycle. Further development, however, is necessary before the description of motion can be completed.

Figure 3 illustrates a 4-bar linkage. Link 1, which is chosen as unity, represents a crank whose motion is rotation through 360 degrees around a center at O_1. Link B, of arbitrary dimension, is the rocker whose motion is oscillatory through, as yet, an undetermined arc around O_2. Link A is a coupler. Link C may be considered a frame containing

pivot points O_1 and O_2 a distance C apart. The dimension of A and C are also arbitrary.

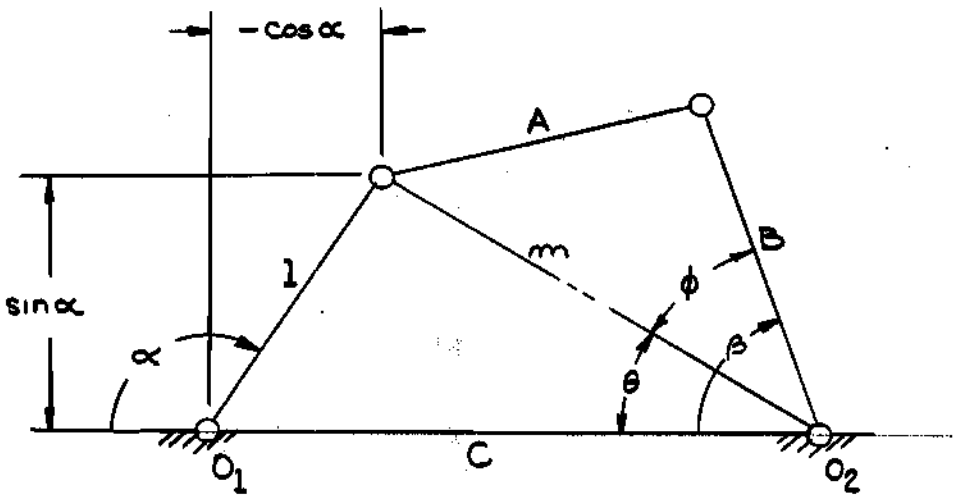


Figure 3

CRANK AND ROCKER TYPE 4-BAR LINKAGE ILLUSTRATING MATHEMATICAL DEVELOPMENT OF FORMULAE

By the law of cosines, it is true that the dimension of the imaginary link m is defined by the following expression:

$$m^2 = (1)^2 + C^2 + 2(1)\, C \cos\alpha \qquad (i)$$

Further,

$$\tan\theta = \frac{\sin\alpha}{C - (-\cos\alpha)}$$

$$\tan\theta = \frac{\sin\alpha}{C + \cos\alpha} \qquad (j)$$

Again, by the law of cosines,

$$A^2 = m^2 + B^2 - 2mB \cos \phi = 1 + C^2 + 2C \cos \alpha + B^2 - 2mB \cos \phi$$

or,

$$\cos \phi = \frac{1 + B^2 + C^2 - A^2 + 2C \cos \alpha}{2mB} \qquad (k)$$

Let $K^2 = (1)^2 + B^2 + C^2 - A^2$

then $$\cos \phi = \frac{K^2 + 2C \cos \alpha}{2mB} \qquad (l)$$

The angle β is the sum of two angles, θ and ϕ,

Substituting for θ and ϕ,

$$\beta = \tan^{-1} \frac{\sin \alpha}{C + \cos \alpha} + \cos^{-1} \frac{K^2 + 2C \cos \alpha}{2mB} \qquad (m)$$

To combine the two terms in the equation for β, both should be expressed as arctan or arccos functions. The angle ϕ is the angle of a right triangle whose adjacent side is $K^2 + 2C \cos \alpha$ and whose hypotenuse is 2mB. The opposite side, therefore, is equal to

$$\sqrt{4mB^2 - \left[K^2 + 2C \cos \alpha\right]^2}$$

and

$$\beta = \tan^{-1} \frac{\sin \alpha}{C + \cos \alpha} + \tan^{-1} \frac{\sqrt{4mB^2 - \left[K^2 + 2C \cos \alpha\right]^2}}{K^2 + 2C \cos \alpha} \qquad (n)$$

The tangent function was elected here in order that a computer program might be employed for collection of data. At the time the data for this paper were collected, the IBM 650 digital computor interpretive system included a subroutine for converting the tangent function to radians, but there was no similar subroutine for the cosine function.

By use of equation (n), angle "β" may be determined for any angle "α" and for any combination of link dimensions which define a crank and rocker 4-bar linkage.

CHAPTER IV

SCOPE AND FORM OF DATA

This paper contains data for all possible combinations of link ratios for variation of:

1. Link A (coupler) from 1.5 to 4.0 at increments of 0.5,
2. Link B (follower) from 1.5 to 4.0 at increments of 0.5, and
3. Link C (frame) from 1.5 to 6.5 at increments of 0.5. The crank is taken as unity.

Obviously, there will occur within these ranges a combination which will not correspond to all of the requirements for a crank and rocker linkage. One example would be A = 4.0, B = 1.5, C = 1.5. Here, $1 + 4 > 1.5 + 1.5$. This combination would be eliminated from the computations.

To demonstrate the follower's motion by the method of trace and deviation, the motion must first be normalized. To do this, the crank's rotation, which is constant, is used as reference. The crank will move through one-half of its range, say RC1, in one-half the time required to move through its entire range. The follower, however, may move only two-fifths of its range. The trace, then, would indicate two-fifths and the deviation would be minus one-tenth, since the follower lags the crank by this value. Figure 4, page 13, illustrates this condition.

Referring to Figure 4, the straight diagonal line in the trace square is drawn to represent the constant motion of the crank, and the curved line shows the normalized motion of the follower. The curved line in the deviation square denotes the amount by which the follower

lags or exceeds the crank in covering its entire range. The slopes of the curves are indications of acceleration and deceleration. In the trace square, a curve which is concave upwards indicates an acceleration, and a curve which is concave downwards indicates a deceleration.

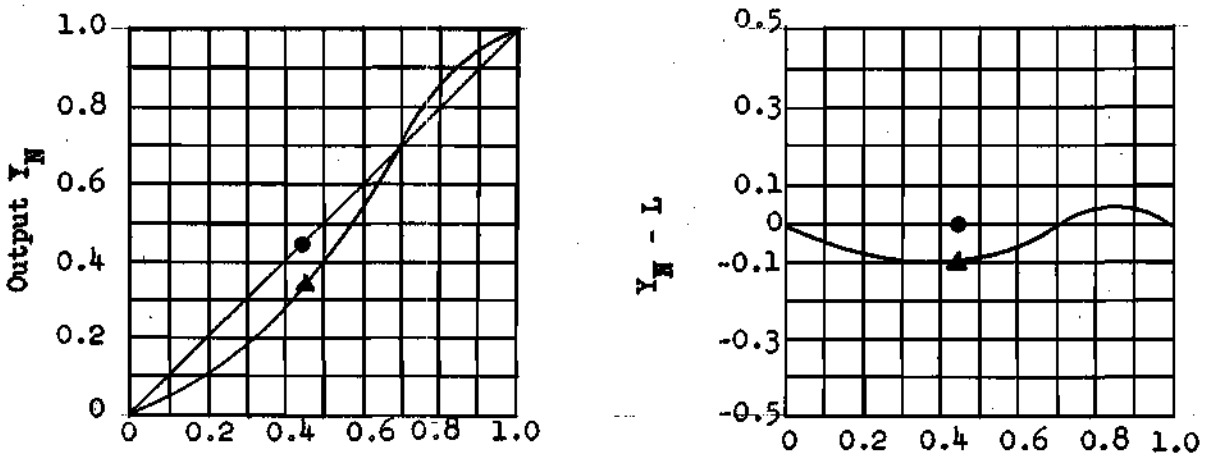


Figure 4

TYPICAL 4-BAR LINKAGE FOLLOWER MOTION ILLUSTRATED BY THE TRACE - DEVIATION METHOD

Acceleration and deceleration are indicated in like manner in the deviation square. Constant follower velocity occurs at the points of curve inflection.

CHAPTER V

HOW TO USE THE DATA AND CURVES FOR DESIGN PURPOSES

The most common use for the data and curves presented herein will be the case in which a specified motion is given the designer and he must select a 4-bar linkage to generate this motion. This motion may be specified as acceleration through 70% of follower range and deceleration through the remaining 30% of range with the further specification that the follower displacement at the time of zero acceleration be that of a follower with uniform motion, or, in other words, for XN equal 0.7, YN equal 0.7 in terms of normalized motion. This prescribed motion is that of the 4-bar linkage group in which A = 4.0, B = 3.5 and C = 2.5 (See pages 284 and 285 listing data and illustrating curves for range of crank, RC_2). Utilization of this group for the above specified linkage will give an accuracy of approximately 1.92×10^{-4} (The deviation) times 0.954383 (RF) which is 1.83×10^{-4} radians in excess of specified displacement of the follower.

For the case where crank motion is limited to oscillation, the data and curves are even more versatile as far as follower design is concerned. For any linkage group herein contained, follower motion and position is established for any position of the crank. Therefore, a

portion of one of the curves may be used for the design of a linkage which would, for example, produce all acceleration for the follower. In other instances, small intervals may be chosen in which the follower demonstrates an approximate constant velocity.

Perhaps the most valuable use to which the accompanying data and graphs may be put is that of function generation. Consider the function $y = x\cos x$ for the possibility of function generation with a 4-bar linkage. To describe this function with trace and deviation curves, first determine the ranges x and y. A simple table of values as shown below will be satisfactory.

TABLE I

SIMULTANEOUS X and Y VALUES FOR
THE FUNCTION $y = x\cos x$

$X_{degrees}$	$X_{radians}$	Y
0	0	0
18	.314159	.29878
36	.628319	.50832
54	.907572	.53346
72	1.256637	.38833
90	1.570796	0
108	1.884955	- .58249
126	2.199115	-1.29262
144	2.478368	-2.00505
162	2.827433	-2.68906
180	3.141592	-3.141592

The X-values from 54 degrees to 180 degrees define ever-decreasing values of Y whose range is + 0.53346 to -3.141592; total range equals 3.675052 radians.

The next step is normalization. With 54 degrees as a starting point for X, there are seven additional X-values up to and including 180 degrees. For X to increase at constant rate, its normalized values will be 1/7, 2/7, etc. Normalized values for Y will be the fractional equivalents of its increase, which is a negative increase in this case, compared to its total range.

TABLE II

NORMALIZED VALUES OF X AND Y FOR
THE FUNCTION y = xcosx

X_N	$Y_N = \frac{y_n - y_o}{\text{range}}$	$Y_N - L = Y_N - X_N$
0	0	0
1/7	.0368	-.1061
2/7	.1452	-.1406
3/7	.3037	-.1249
4/7	.4969	-.0745
5/7	.6907	-.0235
6/7	.8769	.0197
1.0	1.0	0

The values of Y_N and Y_N-L may now be plotted on unit squares versus X_N as abscissa, Figure 5.

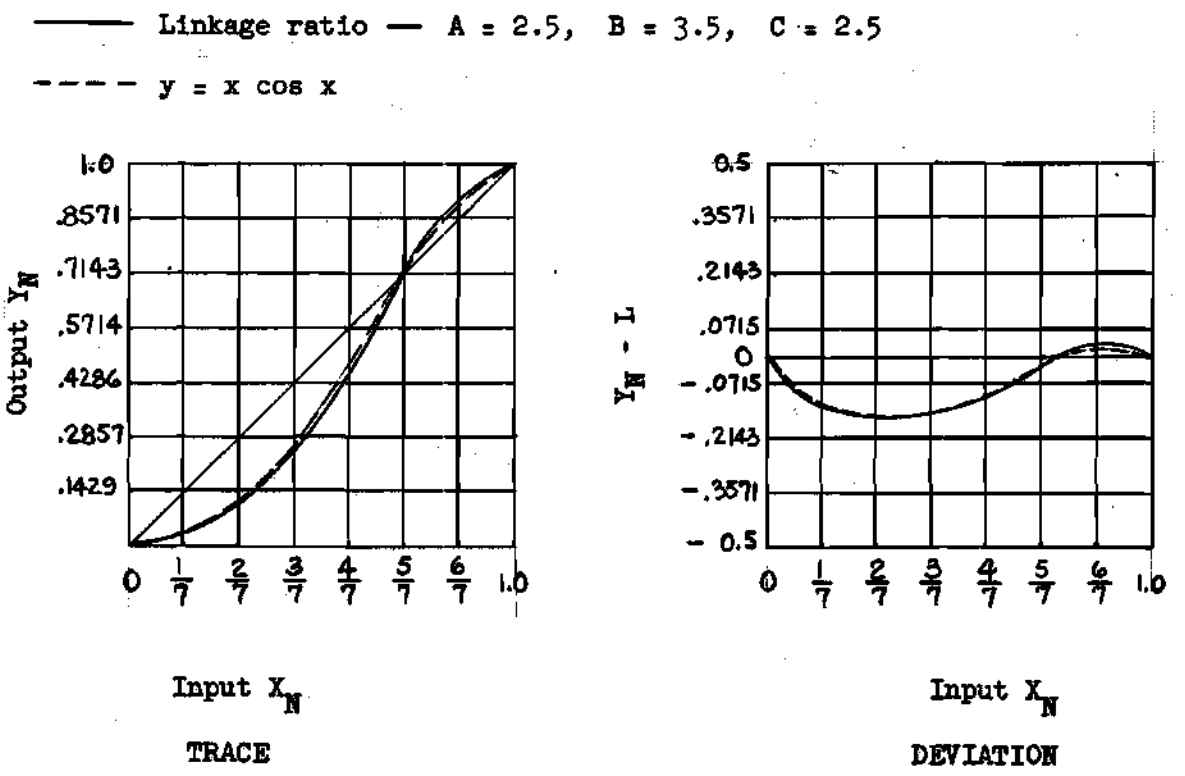


Figure 5

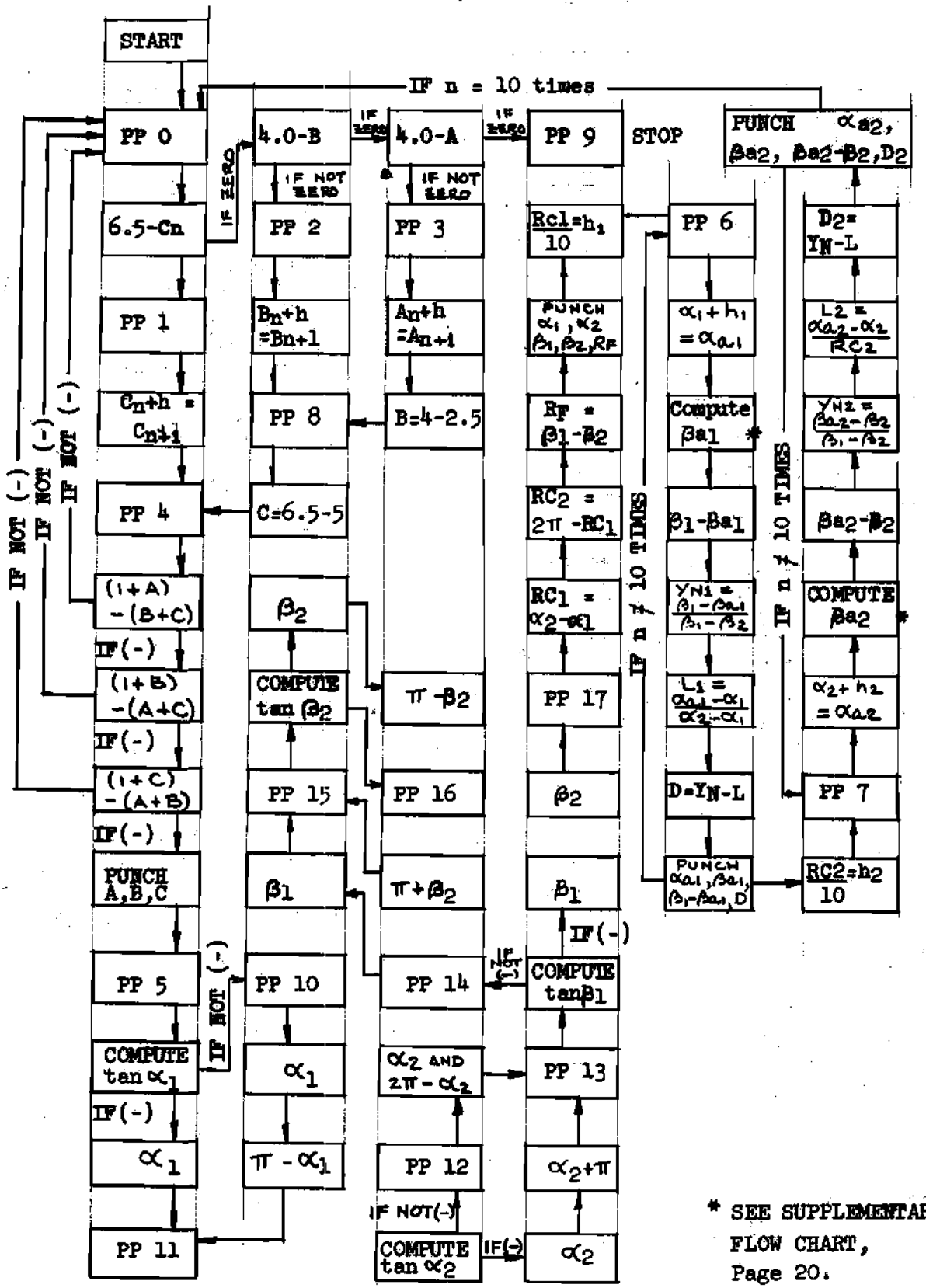
USE OF 4-BAR LINKAGE GRAPHS FOR
FUNCTION GENERATION

The curves shown in Figure 5 are very close approximations of the curves defining crank range RC2 for ratios of A = 2.5, B = 3.5 and C = 2.5 contained on pages 92 and 93 of the appendix. The trace and deviation curves for this linkage are plotted in Figure 5 for comparison.

It is hoped that the designer may, upon becoming familiar with the data and curves presented here and with the given examples, be enabled to synthesize his linkage with facility.

A P P E N D I X

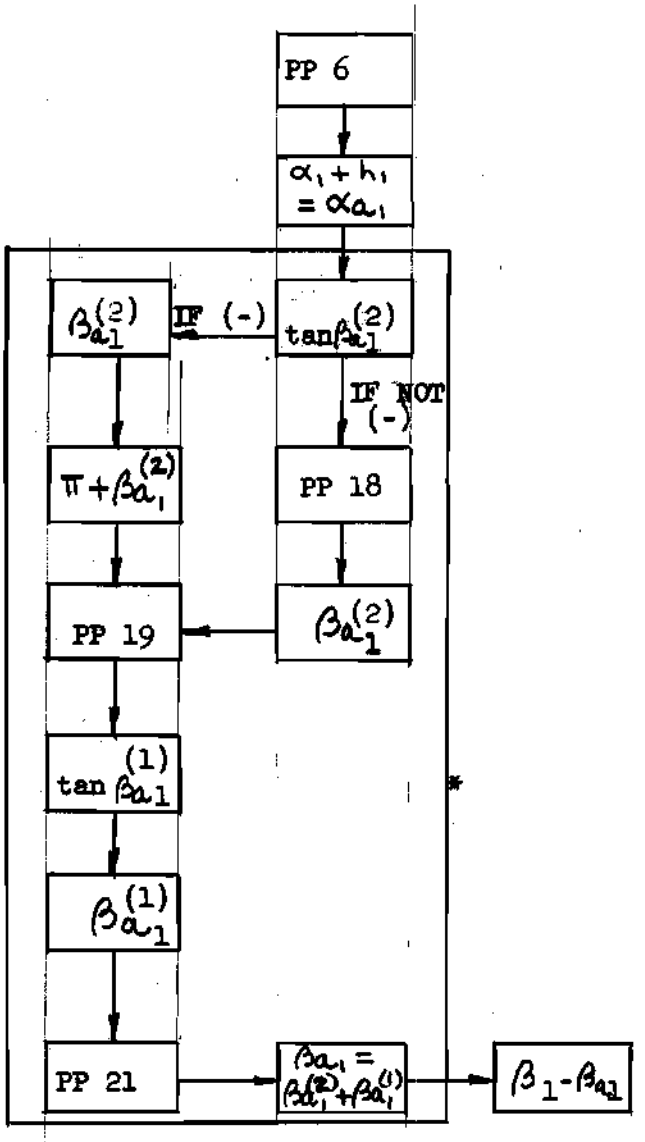
FLOW CHART FOR IBM 650 MACHINE PROGRAM



* SEE SUPPLEMENTARY FLOW CHART, Page 20.

SUPPLEMENTARY FLOW CHART

If the function, tan β, is a negative quantity, the IBM 650 would record a negative angle in the 4th quadrant. Angle β, however, should be a positive angle measured clockwise from the left end of the X - axis (See Figure 1). For this reason, each quantity tangent β is tested in the program loop shown here.



A similar loop is employed to determine the true value of βa_2.

IBM 650 COMPUTER PROGRAM ORDERS

+	9	800	000	000	PP 0
-	1	404	502	552	552: 6.5 - C
+	8	600	552	001	$\neq$ 0, go to PP 1
-	1	405	501	551	551: 4.0 - B
+	8	600	551	002	$\neq$ 0, go to PP 2
-	1	405	500	550	550: 4.0 - A
+	8	600	550	003	$\neq$ 0, go to PP 3
+	8	000	000	009	= 0, go to PP 9
+	9	800	003	000	PP 3
+	1	500	499	500	500: $A_{n+1} = A_n + h$
-	1	405	406	501	501: B = 4.0 - 2.5
+	8	000	000	008	Transfer to PP 8
+	9	800	002	000	PP 2
+	1	501	499	501	501: $B_{n+1} = B_n + h$
+	9	800	008	000	PP 8
-	1	404	407	502	502: C = 6.5 - 5.0
+	8	000	000	004	Transfer to PP 4
+	9	800	001	000	PP 1
+	1	502	499	502	502: $C_{n+1} = C_n$ h
+	9	800	004	000	PP 4
+	1	901	500	553	553: 1 + A
+	1	501	502	556	556: B + C
-	1	553	556	000	000: (1+A) - (B+C)

+	8	700	000	000	≠ (-), go to PP 0
+	1	901	501	554	554: 1 + B
+	1	500	502	557	557: A + C
-	1	554	557	000	000: (1 + B) - (A + C)
+	8	700	000	000	≠ (-), go to PP 0
+	1	901	502	555	555: 1 + C
+	1	500	501	558	558: A + B
-	1	555	558	000	000: (1 + C) - (A + B)
+	8	700	000	000	≠ (-), go to PP 0
+	7	300	500	502	Punch A_1 B_1 C_1
+	9	800	005	000	PP 5
-	1	500	901	000	000: A - 1
+	2	000	000	570	570: $(A-1)^2$
+	2	501	501	571	571: B^2
+	2	502	502	572	572: C^2
+	1	500	901	000	000: A + 1
+	2	000	000	573	573: $(A+1)^2$
+	2	572	405	574	574: $4C^2$
+	2	574	573	575	575: $4C^2(A+1)^2$
+	1	572	573	000	000: $(A+1)^2 + C^2$
-	1	000	571	576	576: $(A+1)^2 + C^2 - B^2$
+	2	576	576	000	000: $\left[(A+1)^2 + C^2 - B^2\right]^2$
-	1	575	000	000	000: $4C^2(A+1)^2 - \left[(A+1)^2 + C^2 - B^2\right]^2$
+	0	300	000	000	000: $\sqrt{4C^2(A+1)^2 - \left[(A+1)^2 + C^2 - B^2\right]^2}$

+	3	000	576	577	577: tan α_1
+	8	700	577	010	$\neq$ (-), go to PP 10
+	0	305	577	000	000: α_1 (4th quadrant)
-	2	000	901	520	520: α_1 (2nd quadrant)
+	8	000	000	011	Transfer to PP 11
+	9	800	010	000	PP 10
+	0	305	577	000	000: α_1 (1st quadrant)
-	1	403	000	520	520: $\pi - \alpha_1$ (1st quadrant)
+	9	800	011	000	PP 11
+	2	574	570	610	610: $4C^2 (A-1)^2$
+	1	570	572	000	000: $(A-1)^2 + C^2$
-	1	000	571	578	578: $(A-1)^2 + C^2 - B^2$
+	2	578	578	000	000: $\left[(A-1)^2 + C^2 - B^2\right]^2$
-	1	610	000	000	000: $4C^2(A-1)^2 - \left[(A-1)^2 + C^2 - B^2\right]^2$
+	0	300	000	000	000: $\sqrt{4C^2(A-1)^2 - \left[(A-1)^2 + C^2 - B^2\right]^2}$
+	3	000	578	579	579: tan α_2
+	8	700	579	012	$\neq$ (-), go to PP 12
+	0	305	579	000	000: α_2 (4th quadrant)
-	1	403	000	521	521: $\pi + \alpha_2$ (4th quadrant)
+	8	000	000	013	Transfer to PP 13
+	9	800	012	000	PP 12
+	0	305	579	000	000: α_2 (1st quadrant)
-	1	904	000	521	521: $2\pi - \alpha_2$ (3rd quadrant)
+	9	800	013	000	PP 13
+	2	574	571	580	580: $4B^2C^2$

+ 1	571	572	581	581: $B^2 + C^2$
- 1	581	573	582	582: $B^2 + C^2 - (A+1)^2$
+ 2	582	582	000	000: $\left[B^2 + C^2 - (A+1)^2\right]^2$
- 1	580	000	000	000: $4B^2C^2 - \left[B^2 + C^2 - (A+1)^2\right]^2$
+ 0	300	000	000	000: $\sqrt{4B^2C^2 - \left[B^2 + C^2 - (A+1)^2\right]^2}$
+ 3	000	582	583	583: $\tan \beta_1$
+ 8	700	583	014	$\neq$ (-), go to PP 14
+ 0	305	583	000	000: β_1 (1st quadrant)
+ 1	403	000	522	522: $\pi + \beta_1$ (1st quadrant)
+ 8	000	000	015	Transfer to PP 15
+ 9	800	014	000	PP 14
+ 0	305	583	522	000: β_1 (4th quadrant)
+ 9	800	015	000	PP 15
- 1	581	570	584	584: $B^2 + C^2 - (A-1)^2$
+ 2	584	584	000	000: $\left[B^2 + C^2 - (A-1)^2\right]^2$
- 1	580	000	000	000: $4B^2C^2 - \left[B^2 + C^2 - (A-1)^2\right]^2$
+ 0	300	000	000	000: $\sqrt{4B^2C^2 - \left[B^2 + C^2 - (A-1)^2\right]^2}$
+ 3	000	584	585	585: $\tan \beta_2$
+ 8	700	585	016	$\neq$ (-), go to PP 16
+ 0	305	585	000	000: β_2 (4th quadrant)
+ 1	403	000	523	523: $\pi + \beta_2$ (1st quadrant)
+ 8	000	000	017	Transfer to PP 17
+ 9	800	016	000	PP 16
+ 0	305	585	523	523: β_2 (2nd quadrant)
+ 9	800	017	000	PP 17

- 1	521	520	524	524: $\alpha_2 - \alpha_1 = R_{c_1}$
- 1	904	524	525	525: $R_{c_2} = 2\pi - R_{c_1}$
- 1	522	523	526	526: $R_f = \beta_1 - \beta_2$
+ 7	300	520	523	Punch α_1, α_2, β_1, β_2
+ 7	300	524	526	Punch R_{c_1} , R_{c_2} , R_f
+ 3	524	905	401	401: $R_{c_1/10} = h_1$
+ 1	900	520	527	527: α_1 (also in 520)
+ 9	800	006	000	PP 6
+ 1	527	401	527	527: $\alpha_{a_1} = \alpha_1 + h_1$
+ 2	500	500	000	000: A^2
- 1	571	000	000	000: $B^2 - A^2$
+ 1	572	000	000	000: $C^2 + B^2 - A^2$
+ 1	901	000	586	586: $K^2 = 1 + C^2 + B^2 - A^2$
+ 0	304	527	587	587: $\cos \alpha_{a_1}$
+ 2	502	587	000	000: $C \cos \alpha_{a_1}$
+ 2	902	000	588	588: $2C \cos \alpha_{a_1}$
+ 1	572	588	000	000: $C^2 + 2C \cos \alpha_{a_1}$
+ 1	901	000	589	589: $m^2 = 1 + C^2 + 2C \cos \alpha_{a_1}$
+ 2	405	571	000	000: $4B^2$
+ 2	000	589	590	590: $4m^2B^2$
+ 1	586	588	591	591: $K^2 + 2C \cos \alpha_{a_1}$
+ 2	591	591	592	592: $\left[K^2 + 2C \cos \alpha_{a_1}\right]^2$
- 1	590	592	000	000: $4m^2B^2 - \left[K^2 + 2C \cos \alpha_{a_1}\right]^2$

+ 0	300	000	000	000: $\sqrt{4m^2B^2 - [K^2+2C\cos\alpha_{a_1}]^2}$
+ 3	000	591	593	593: tan $\beta_{a_1}(2)$
+ 8	700	593	018	$\neq$ (-), go to PP 18
+ 0	305	593	000	000: $\beta_{a_1}(2)$ (4th quadrant)
+ 1	403	000	650	650: $\pi + \beta_{a_1}(2)$ (1st quadrant)
+ 8	000	000	019	Transfer to PP 19
+ 9	800	018	000	PP 18
+ 0	305	593	650	650: $\beta_{a_1}(2)$ (2nd quadrant)
+ 9	800	019	000	PP 19
+ 1	502	587	594	594: C + cos α_{a_1}
+ 0	303	527	000	000: Sin α_{a_1}
+ 3	000	594	595	595: tan $\beta_{a_1}(1)$
+ 0	305	595	651	651: $\beta_{a_1}(1)$ (2nd quadrant)
+ 9	800	021	000	PP 21
+ 1	650	651	528	528: $\beta_{a_1} = \beta_{a_1}(2) + \beta_{a_1}(1)$
- 1	522	528	529	529: $\beta_1 - \beta_{a_1}$
+ 3	529	526	530	530: $Yn_1 = \frac{\beta_1 - \beta_{a_1}}{\beta_1 - \beta_2}$
- 1	527	520	000	000: $\alpha_{a_1} - \alpha_1$
+ 3	000	524	000	000: $L_1 = \frac{\alpha_{a_1} - \alpha_1}{\alpha_2 - \alpha_1}$
- 1	530	000	531	531: $D_1 = Yn_1 - L_1$
+ 7	300	527	531	Punch α_{a_1}, β_{a_1}, $\beta_1 - \beta_{a_1}$, Yn_1, D_1
+ 8	100	010	006	Return to PP 6 10 times
+ 3	525	905	402	402: $Rc_2/10 = h_2$

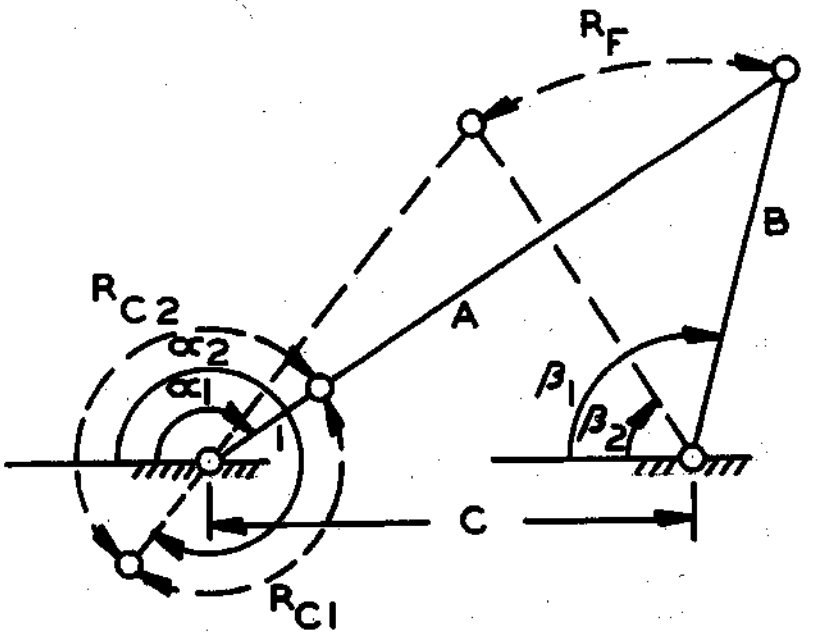
+ 1	900	521	532	532: α_2 (also in 521)
+ 9	800	007	000	PP 7
+ 1	532	402	532	532: $\alpha a_2 = \alpha_2 + h_2$
+ 0	304	532	596	596: $\cos \alpha a_2$
+ 2	502	596	000	000: $C \cos \alpha a_2$
+ 2	902	000	597	597: $2C \cos \alpha a_2$
+ 1	572	597	000	000: $C^2 + 2C \cos \alpha a_2$
+ 1	901	000	598	598: $m^2 = 1 + C^2 + 2C \cos \alpha a_2$
+ 2	405	571	000	000: $4B^2$
+ 2	000	598	599	599: $4m^2B^2$
+ 1	586	597	600	600: $\left[K^2 + 2C \cos \alpha a_2\right]$
+ 2	600	600	601	601: $\left[K^2 + 2C \cos \alpha a_2\right]^2$
- 1	599	601	000	000: $4m^2B^2 - \left[K^2 + 2C \cos \alpha a_2\right]^2$
+ 0	300	000	000	000: $\sqrt{4m^2B^2 - \left[K^2 + 2C \cos \alpha a_2\right]^2}$
+ 3	000	600	602	602: $\tan \beta a_2(2)$
+ 8	700	602	022	$\neq$ (-), go to PP 22
+ 0	305	602	000	000: $\beta a_2(2)$ (4th quadrant)
+ 1	403	000	652	652: $\pi + \beta a_2(2)$ (1st quadrant)
+ 8	000	000	023	Transfer to PP 23
+ 9	800	022	000	PP 22
+ 0	305	602	652	652: $\beta a_2(2)$ (2nd quadrant)
+ 9	800	023	000	PP 23
+ 1	502	596	603	603: $C + \cos \alpha a_2$
+ 0	303	532	000	000: $\sin \alpha a_2$
+ 3	000	603	604	604: $\tan \beta a_2(1)$

+ 0	305	604	653	653: $\beta a_2^{(1)}$ (2nd quadrant)
+ 9	800	025	000	PP 25
+ 1	652	653	533	533: $\beta a_2 = \beta a_2^{(2)} + \beta a_2^{(1)}$
- 1	533	523	534	534: $\beta a_2 - \beta_2$
+ 3	534	526	535	535: $y n_2 = \frac{\beta a_2 - \beta_2}{R_f}$
- 1	532	521	000	000: $\alpha a_2 - \alpha_2$
+ 3	000	525	000	000: $L_2 = \frac{\alpha a_2 - \alpha_2}{Rc_2}$
- 1	535	000	536	536: $D_2 = y n_2 - L_2$
+ 7	300	532	536	Punch αa_2, βa_2, βa_2,- β_2, $y n_2$, D_2
+ 7	300	900	900	Space Punch
+ 8	200	010	007	Return to PP 7 10 times
+ 8	300	000	000	Return to PP 0
+ 9	800	009	000	PP 9
+ 0	000	000	000	Stop

CONSTANT STORAGE

+ 3	141	592	750	403: π
+ 6	500	000	050	404: 6.5
+ 4	000	000	050	405: 4
+ 2	500	000	050	406: 2.5
+ 5	000	000	050	407: 5
+ 5	000	000	049	499: h = 0.5
+ 1	500	000	050	500: A = 1.5
+ 1	500	000	050	501: B = 1.5
+ 1	000	000	050	502: C = 1

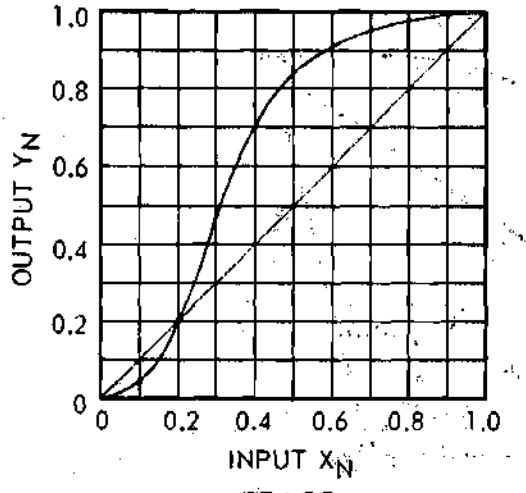
DATA AND CURVES



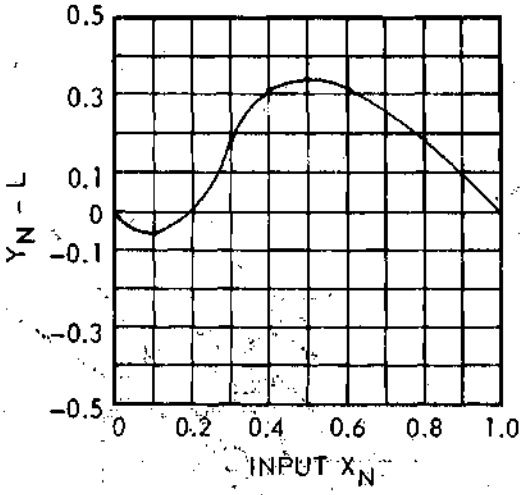
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 1.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.323930	$R_F = \beta_1 - \beta_2$
B = 1.5	$R_{C2} = 2\pi - R_{C1} =$ 3.959255	= 1.635325
C = 1.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.042272	-0.057728	0.010645	-0.089355
0.208349	0.008349	0.044088	-0.155912
0.482727	0.182727	0.105781	-0.194219
0.710392	0.310392	0.201023	-0.198977
0.842762	0.342762	0.328314	-0.171685
0.916609	0.316609	0.478376	-0.121624
0.959103	0.259103	0.638988	-0.061012
0.983503	0.183503	0.796874	-0.003126
0.996134	0.096134	0.932551	0.032551
1.000000	0.000000	1.000000	0.000000

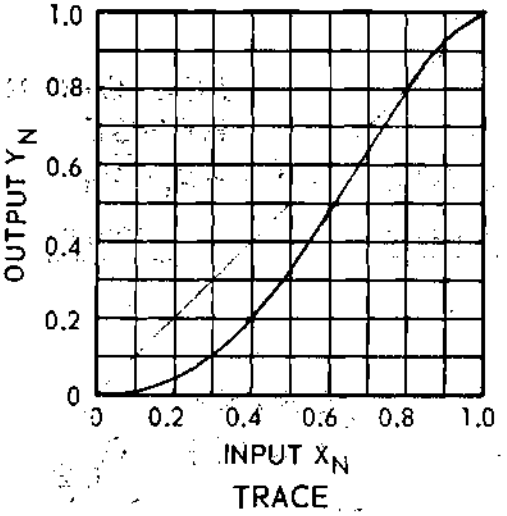
All angles measured in radians.



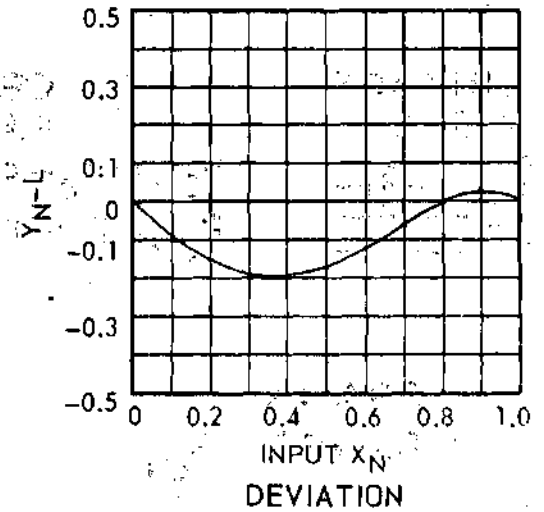
TRACE



DEVIATION

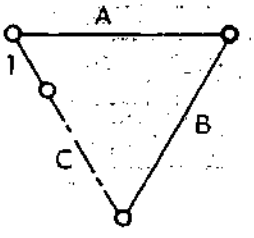


TRACE



DEVIATION

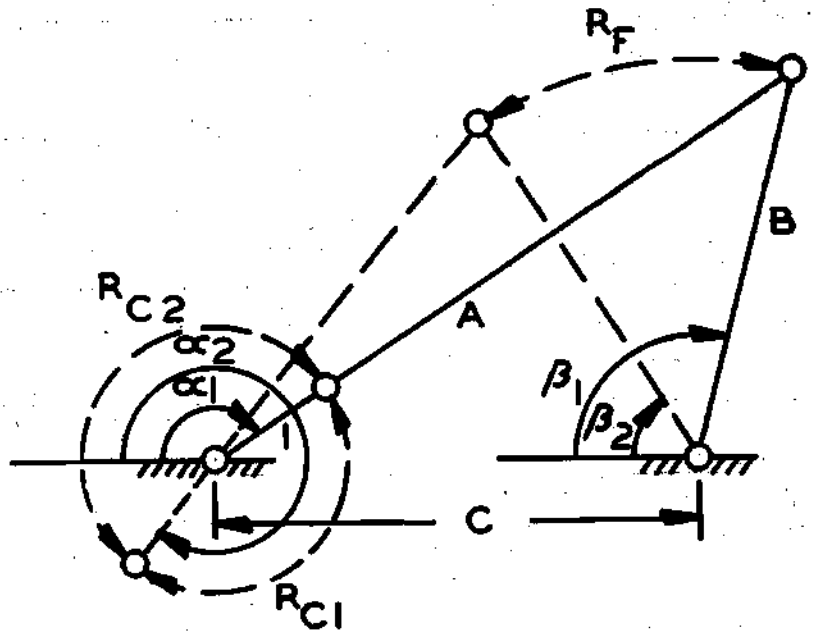
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 1.5

B = 1.5

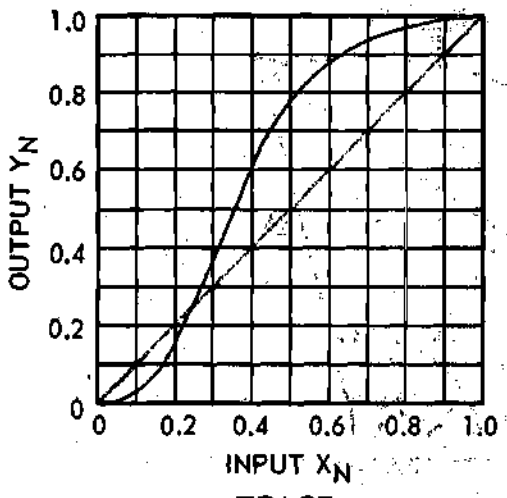
C = 1.5



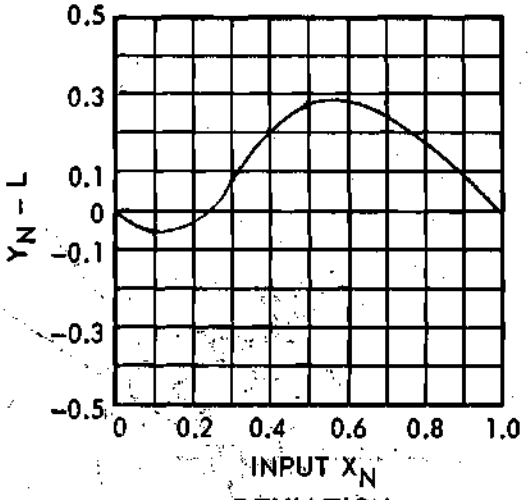
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 1.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.591789	$R_F = \beta_1 - \beta_2$
B = 2.0		= 1.099607
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.691396	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037248	-0.062752	0.010356	-0.089644
0.165041	-0.034959	0.043112	-0.156888
0.379722	0.079722	0.104132	-0.195868
0.610201	0.210201	0.200387	-0.199613
0.780028	0.280028	0.332736	-0.167264
0.883297	0.283297	0.491514	-0.108486
0.943224	0.243224	0.660281	-0.039719
0.977246	0.177246	0.819781	0.019781
0.994681	0.094681	0.945664	0.045664
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

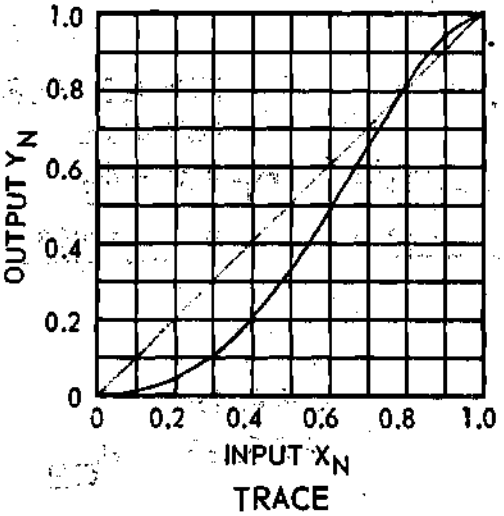


TRACE

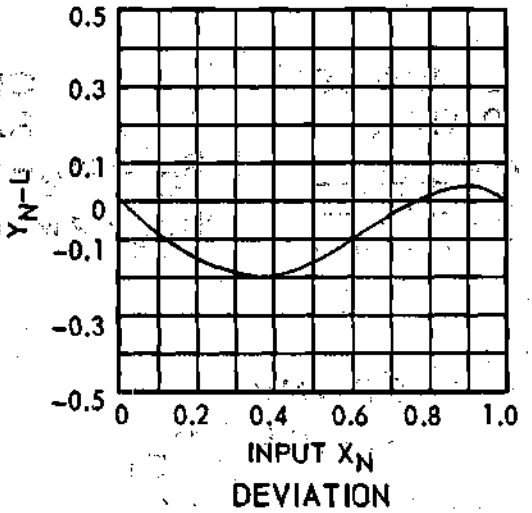


DEVIATION

CRANK RANGE RC1



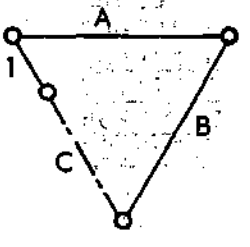
TRACE



DEVIATION

CRANK RANGE RC2

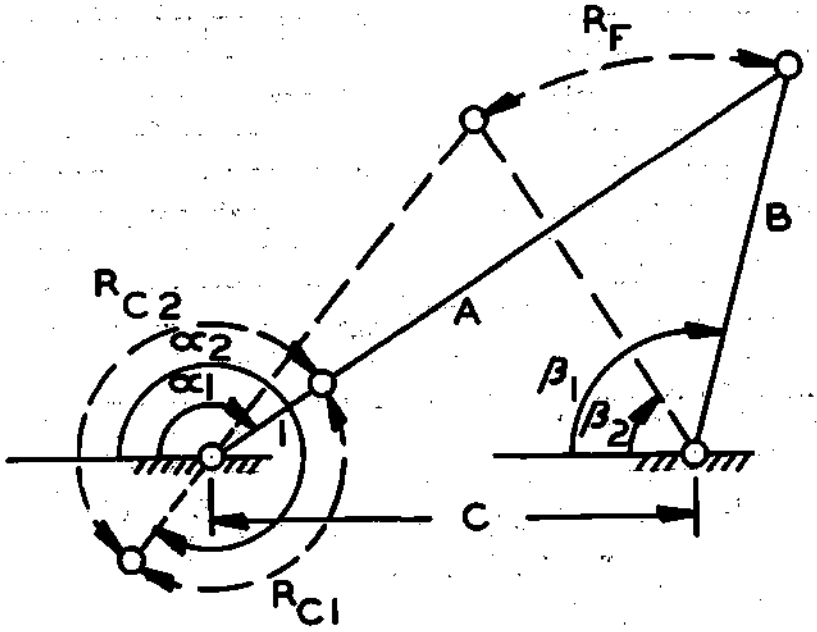
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 1.5

B = 2.0

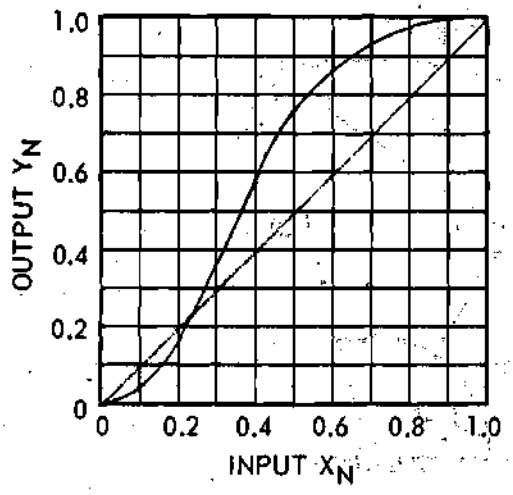
C = 2.0

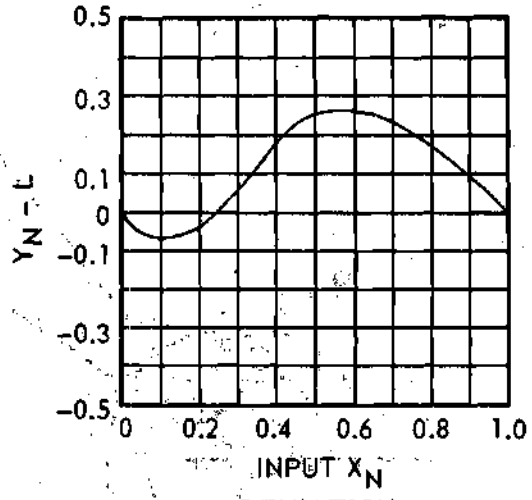


LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 1.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.718161	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.565024	= 0.846863
C = 2.5		

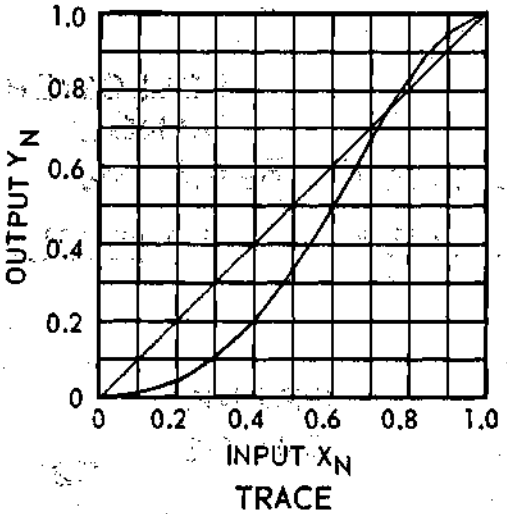
CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.036962	-0.063038	0.010058	-0.089942
0.157650	-0.042350	0.042022	-0.157978
0.355119	0.055119	0.101950	-0.198050
0.576032	0.176032	0.197703	-0.202297
0.753251	0.253251	0.331692	e0.168308
0.867667	0.267667	0 494461	-0.105539
0.935506	0.235506	0.667317	-0.032683
0.974157	0.174157	0.827842	0.027842
0.993955	0.093955	0.949994	0.049994
1.000000	0.000000	1.000000	0.000000

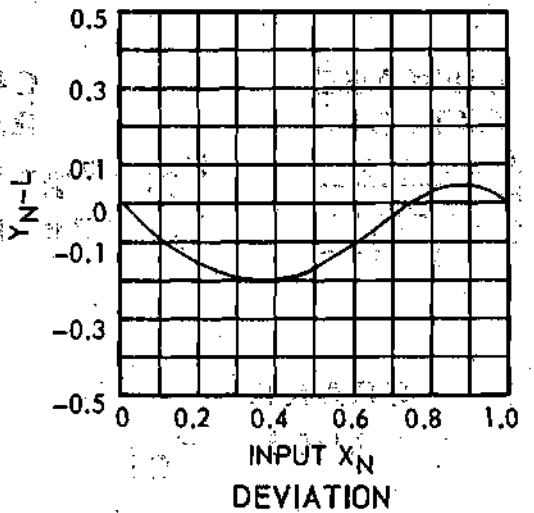
All angles measured in radians.





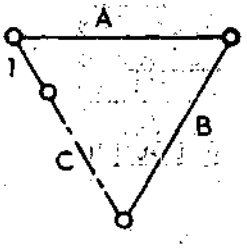
CRANK RANGE RC1





CRANK RANGE RC2

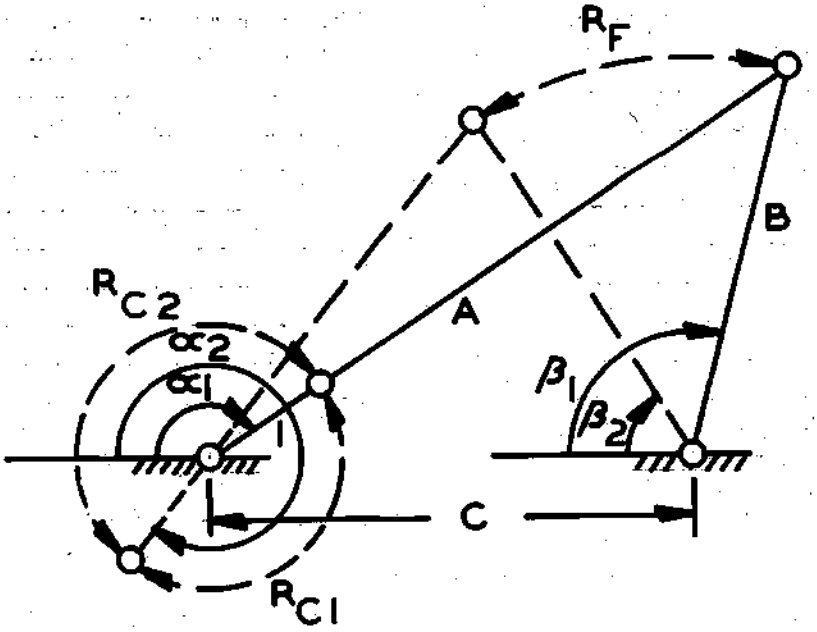
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 1.5

B = 2.5

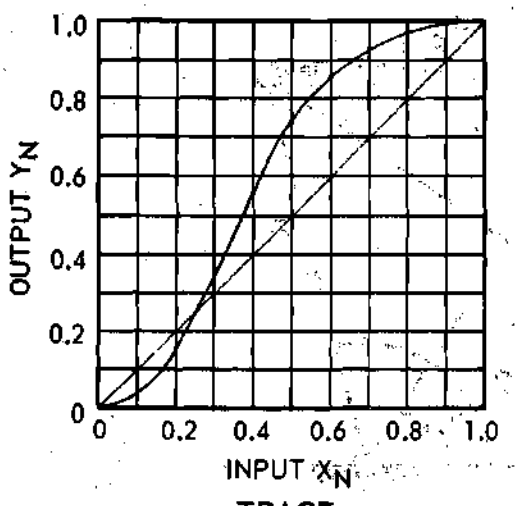
C = 2.5



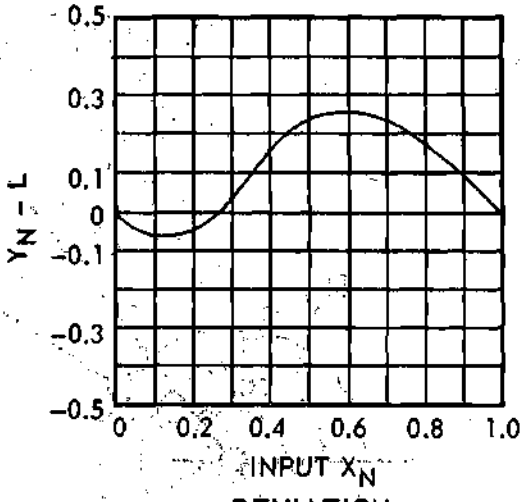
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 1.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.795247	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.487938	= 0.692691
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037158	-0.062842	0.009828	-0.090172
0.155173	-0.044827	0.041156	-0.158844
0.344748	0.044748	0.100150	-0.199850
0.559410	0.159410	0.195228	-0.204772
0.738599	0.238599	0.329915	-0.170085
0.858548	0.258548	0.495102	-0.104898
0.930876	0.230876	0.670654	-0.029346
0.972280	0.172280	0.832033	0.032033
0.993510	0.093510	0.952230	0.052230
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

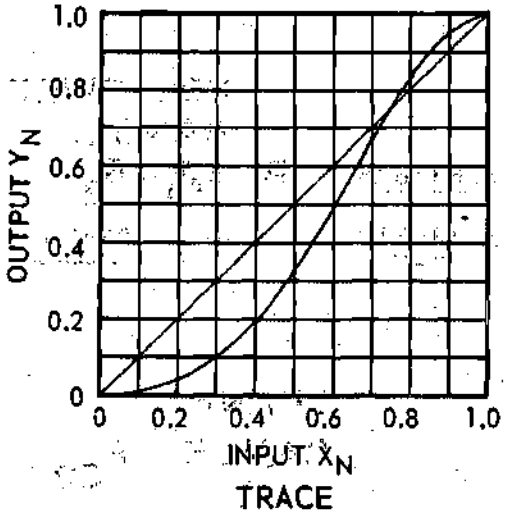


TRACE

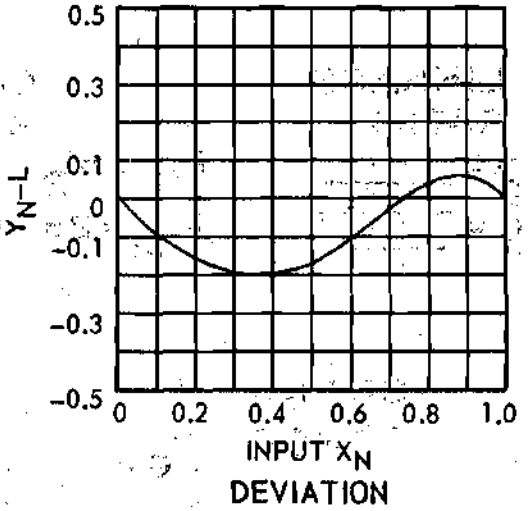


DEVIATION

CRANK RANGE RC1



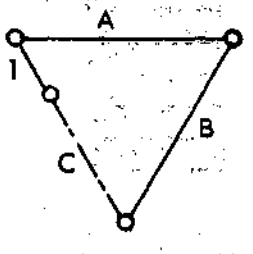
TRACE



DEVIATION

CRANK RANGE RC2

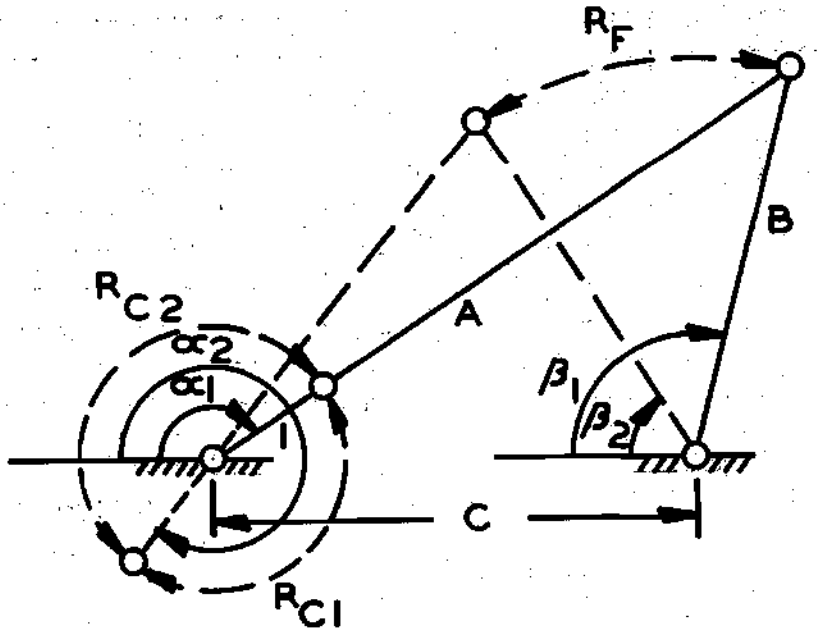
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 1.5

B = 3.0

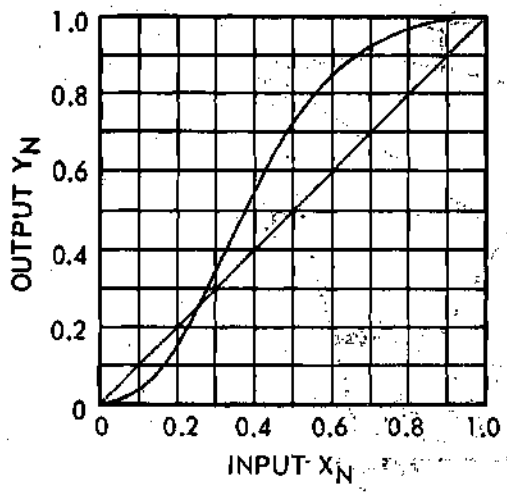
C = 3.0



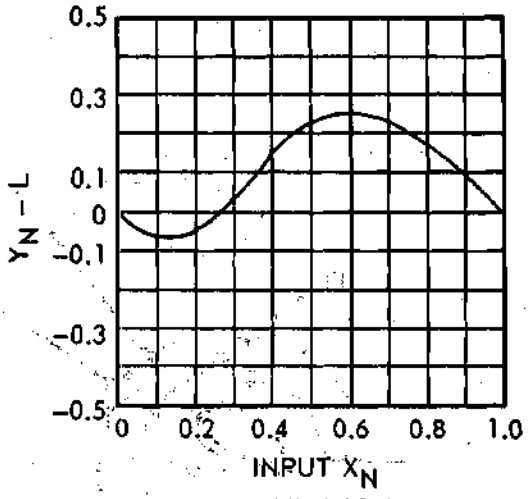
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 1.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.847875	$R_F = \beta_1 - \beta_2$
B = 3.5		= 0.587436
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.435310	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037423	-0.062577	0.009650	-0.090350
0.154147	-0.045853	0.040479	-0.159521
0.339222	0.039222	0.098714	-0.201286
0.549723	0.149723	0.193153	-0.206847
0.729426	0.229426	0.328162	-0.171838
0.852582	0.252582	0.494990	-0.105010
0.927784	0.227784	0.672501	-0.027499
0.971014	0.171014	0.834594	0.034594
0.993208	0.093208	0.953606	0.053606
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

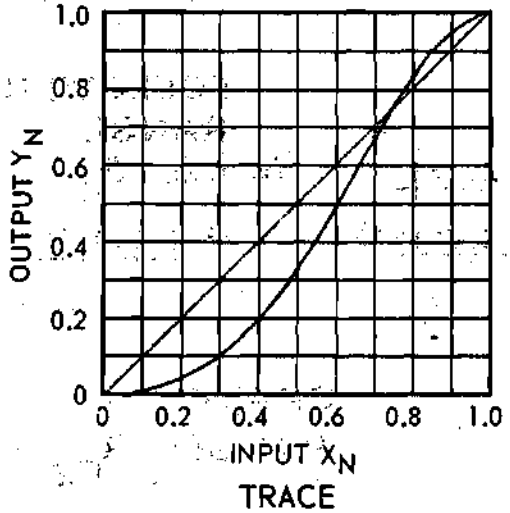


TRACE

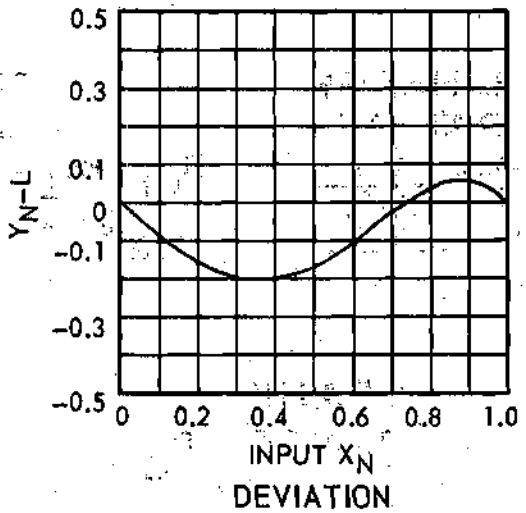


DEVIATION

CRANK RANGE RC1



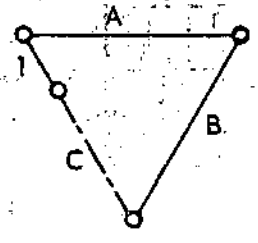
TRACE



DEVIATION

CRANK RANGE RC2

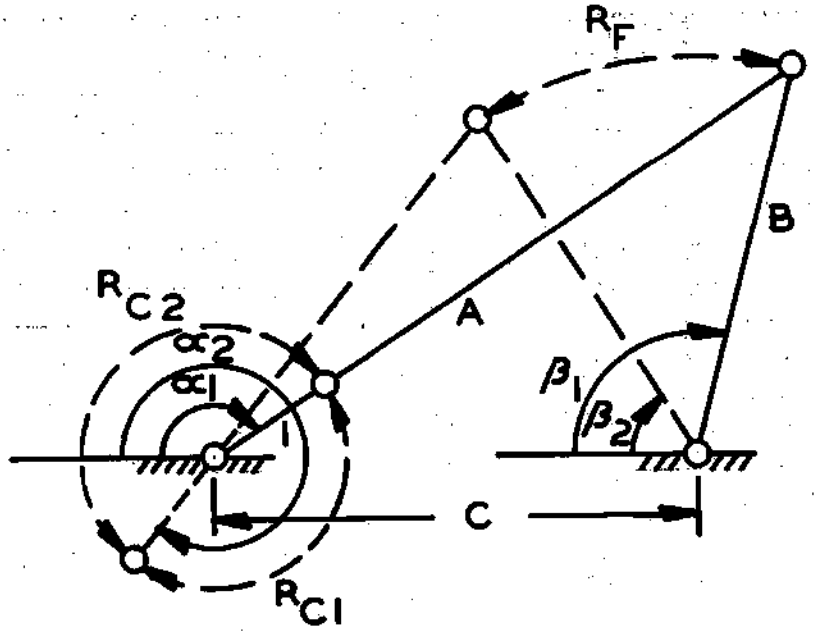
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 1.5

B = 3.5

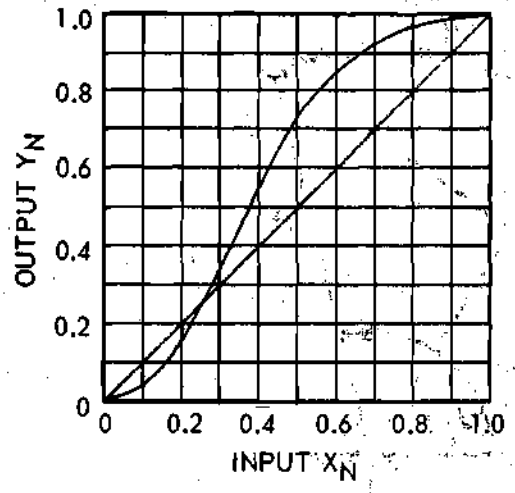
C = 3.5



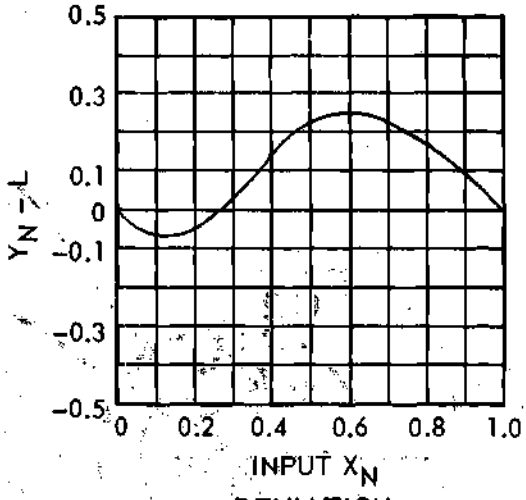
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 1.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.886310	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.510566
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.396876	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037679	-0.062321	0.009509	-0.090491
0.153688	-0.046312	0.039941	-0.160059
0.335866	0.035866	0.097559	-0.202441
0.543432	0.143432	0.191434	-0.208566
0.723167	0.223167	0.326587	-0.173413
0.848382	0.248382	0.494608	-0.105392
0.925573	0.225573	0.673619	-0.026381
0.970102	0.170102	0.836316	0.036316
0.992989	0.092989	0.954540	0.054540
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

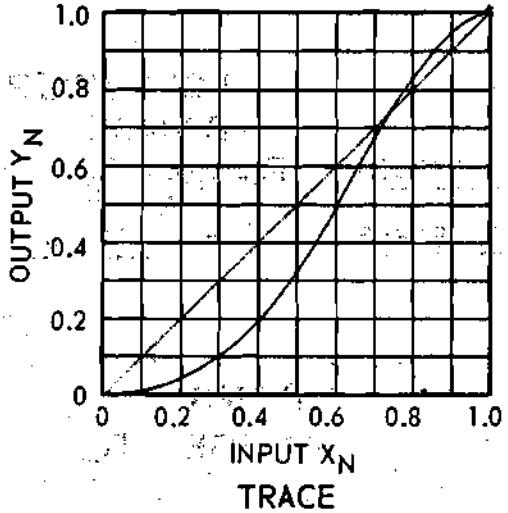


TRACE

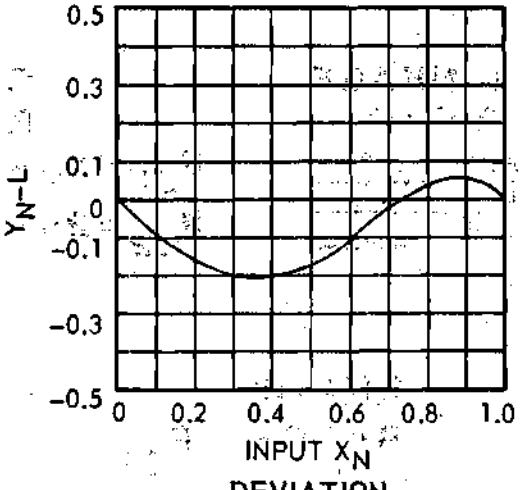


DEVIATION

CRANK RANGE RC1



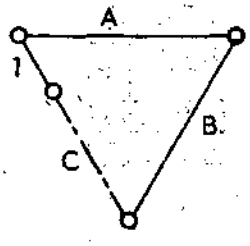
TRACE



DEVIATION

CRANK RANGE RC2

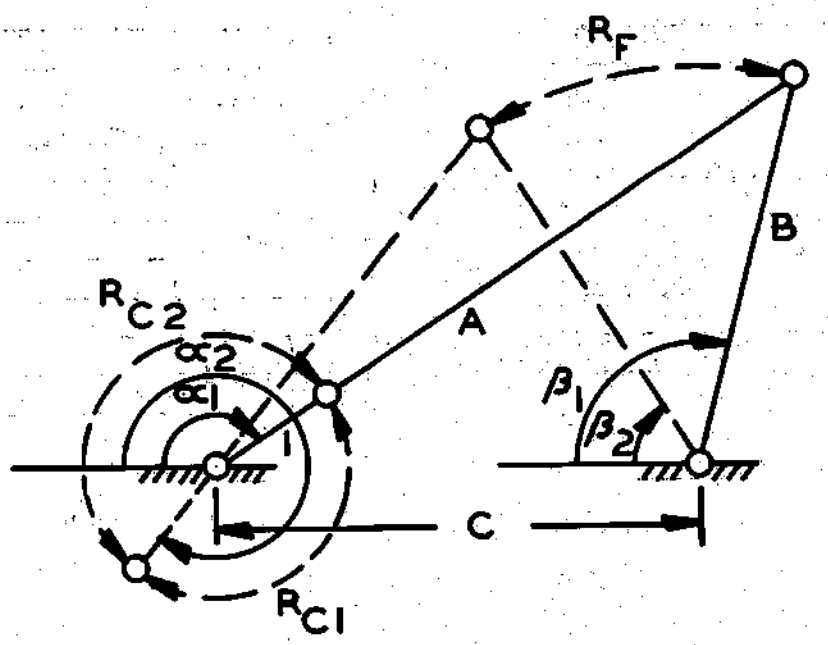
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 1.5

B = 4.0

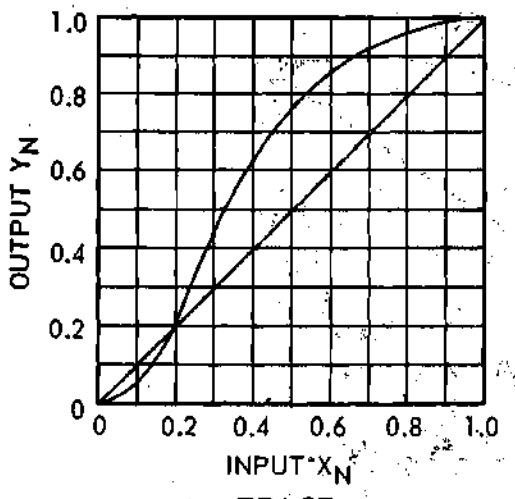
C = 4.0



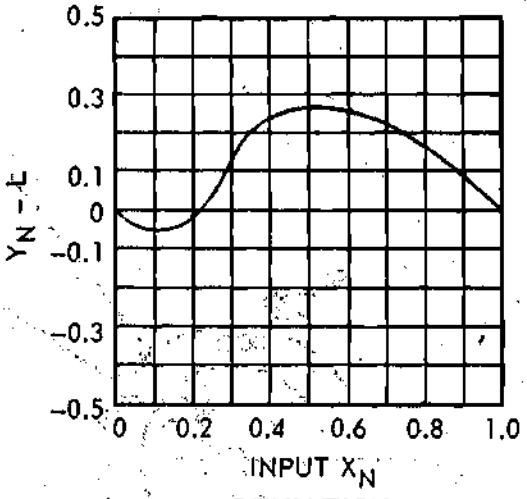
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.789330	$R_F = \beta_1 - \beta_2$
B = 1.5		= 1.541555
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.493855	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.050296	-0.049704	0.014372	-0.085628
0.213267	0.013267	0.060816	-0.139184
0.433322	0.133322	0.142344	-0.157656
0.624648	0.224648	0.255601	-0.144399
0.763043	0.263043	0.391542	-0.108458
0.858511	0.258511	0.539754	-0.060246
0.923597	0.223597	0.690322	-0.009678
0.966523	0.166523	0.832115	0.032115
0.991554	0.091554	0.947507	0.047507
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

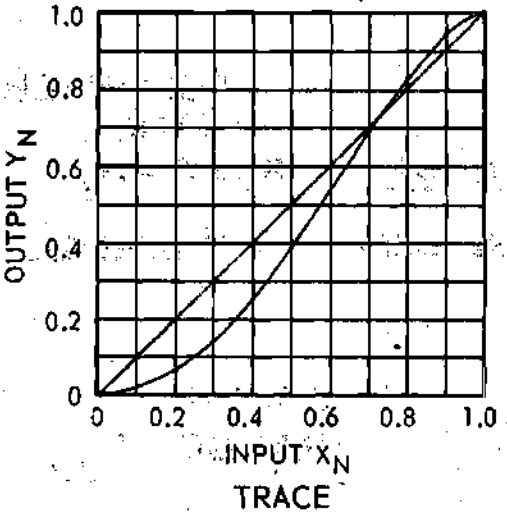


TRACE

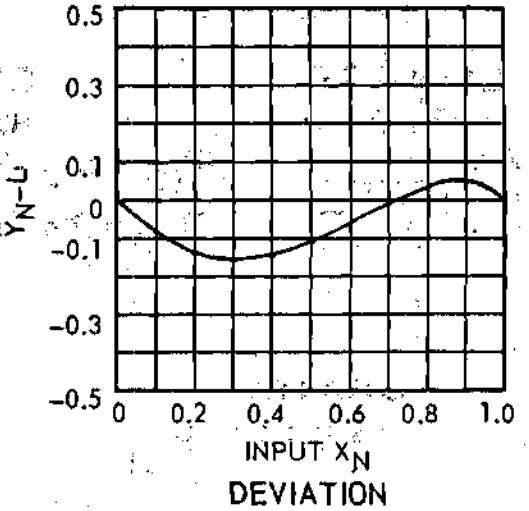


DEVIATION

CRANK RANGE RC1



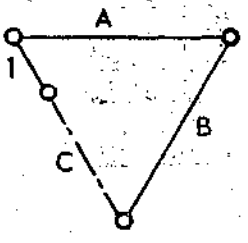
TRACE



DEVIATION

CRANK RANGE RC2

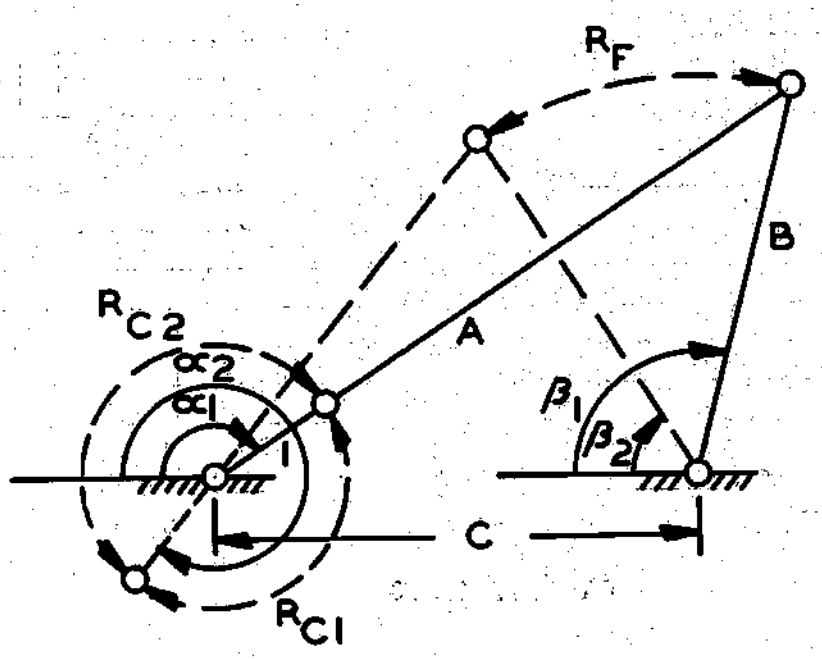
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 1.5

C = 2.0



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 1.952300	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 4.330885	= 1.541555
C = 1.5		

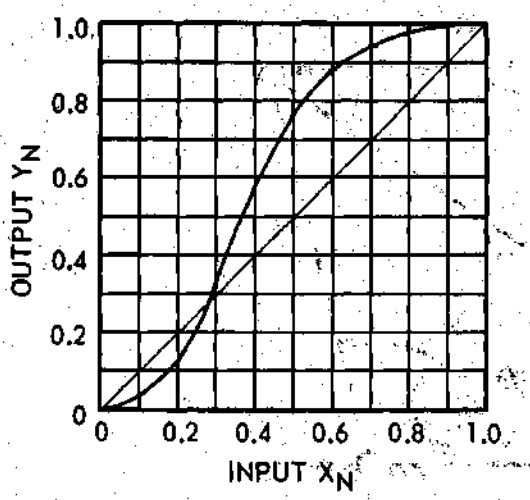
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.025632	-0.074368
0.126197	-0.073803
0.328182	0.028182
0.576132	0.176132
0.765971	0.265971
0.879917	0.279917
0.943964	0.243964
0.978631	0.178631
0.995286	0.095286
1.000000	0.000000

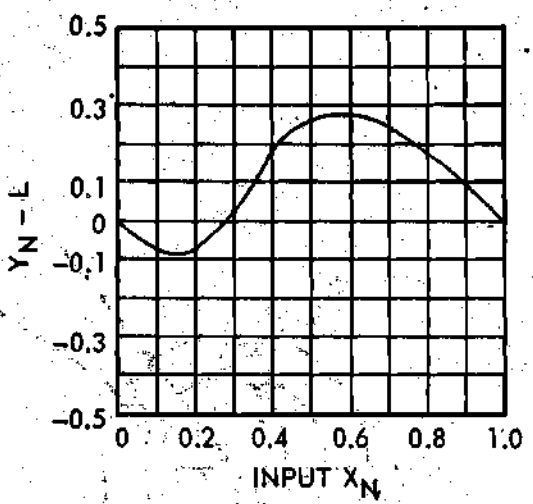
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.017749	-0.082251
0.063919	-0.136081
0.134778	-0.165222
0.230066	-0.169934
0.348948	-0.151052
0.487865	-0.112135
0.639842	-0.060158
0.793818	-0.006182
0.930167	0.030167
1.000000	0.000000

All angles measured in radians.

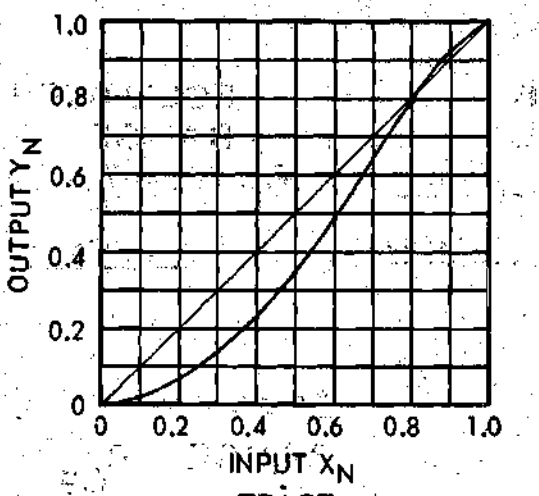


TRACE

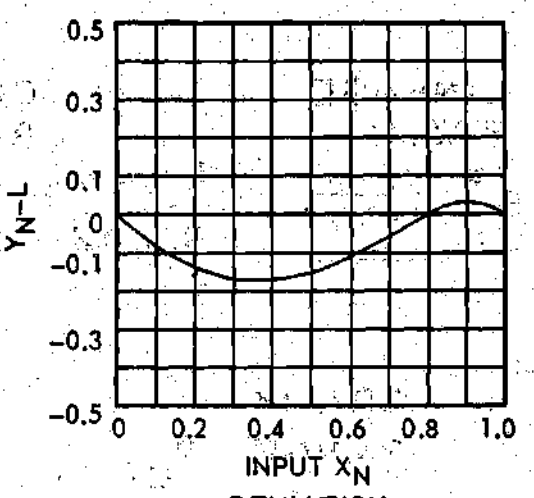


DEVIATION

CRANK RANGE RC1



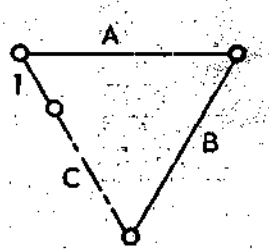
TRACE



DEVIATION

CRANK RANGE RC2

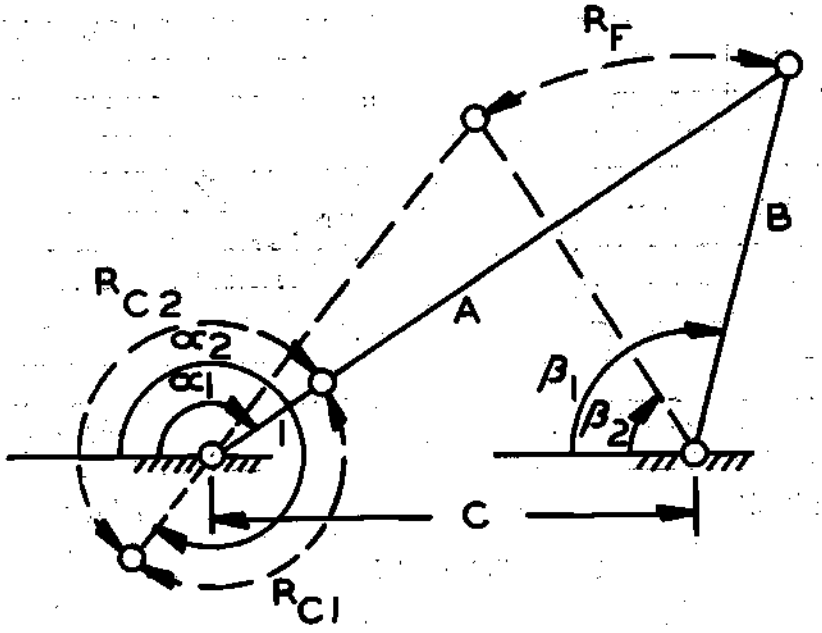
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 2.0

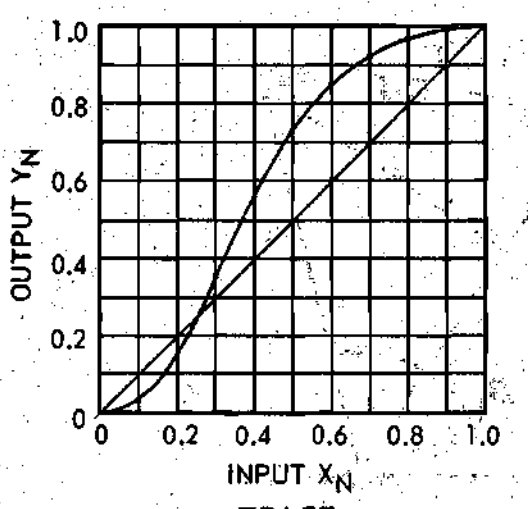
C = 1.5



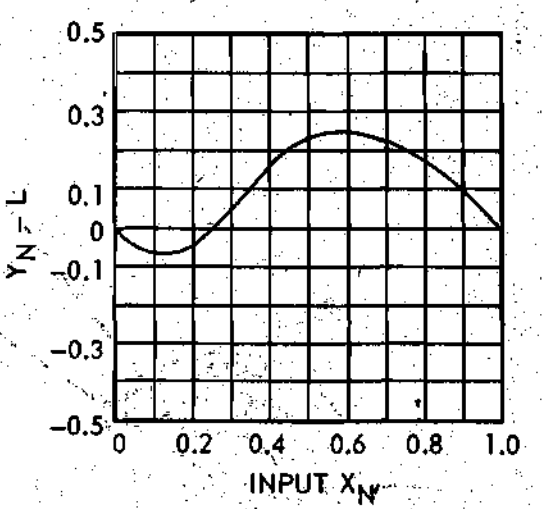
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.546211	$R_F = \beta_1 - \beta_2$
B = 2.0		= 1.190764
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.736974	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035365	-0.064635	0.014657	-0.085343
0.155542	-0.044458	0.058173	-0.141827
0.352298	0.052298	0.131568	-0.168432
0.564327	0.164327	0.235242	-0.164758
0.733729	0.233729	0.365975	-0.134025
0.849658	0.249658	0.516027	-0.083973
0.923912	0.223912	0.673994	-0.026006
0.968861	0.168861	0.824809	0.024809
0.992673	0.092673	0.946306	0.046306
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

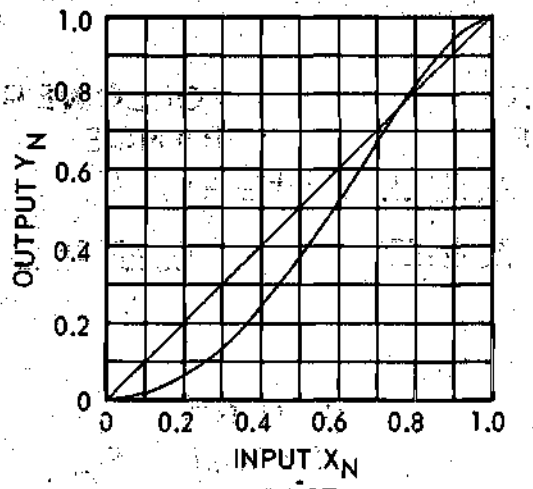


TRACE

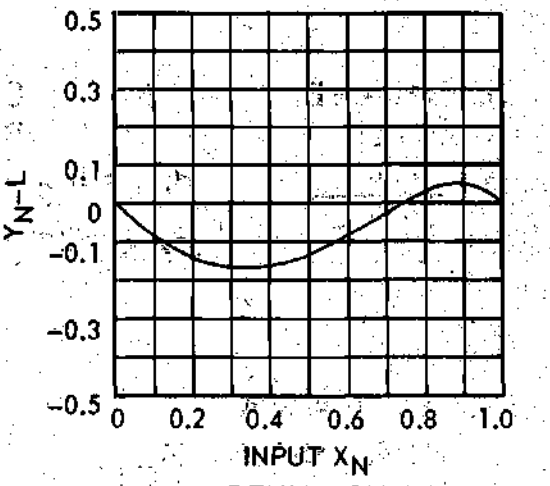


DEVIATION

CRANK RANGE RC1



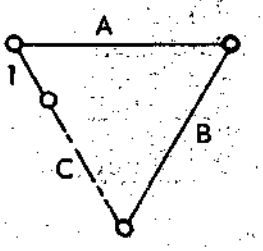
TRACE



DEVIATION

CRANK RANGE RC2

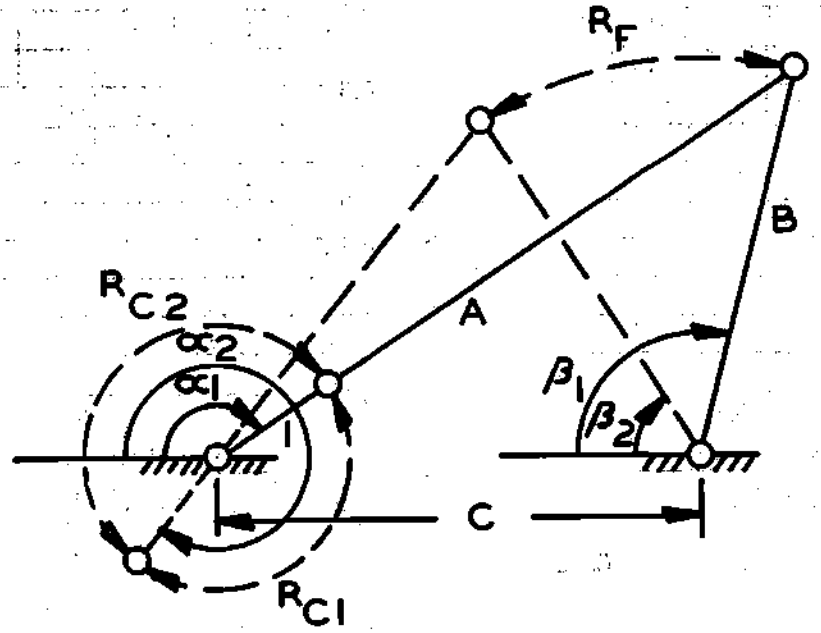
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 2.0

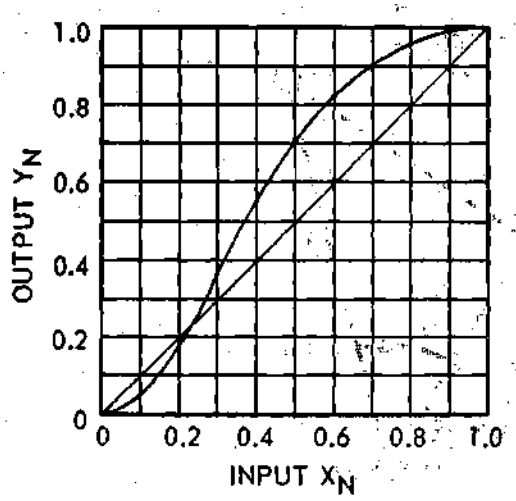
C = 2.0



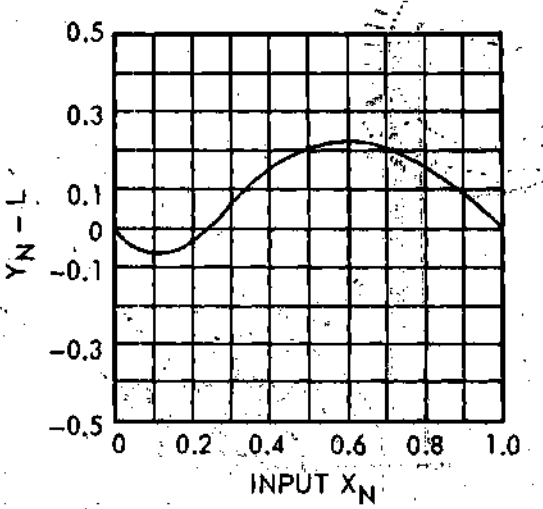
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.001115	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.282070	= 1.055708
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.042048	-0.057952	0.014280	-0.085720
0.171959	-0.028041	0.061063	-0.138937
0.361957	0.061957	0.144900	-0.155100
0.554050	0.154050	0.263899	-0.136101
0.709959	0.209959	0.408351	-0.091649
0.824152	0.224152	0.564831	-0.035169
0.904152	0.204152	0.719377	0.019377
0.957658	0.157658	0.857036	0.057036
0.989216	0.089216	0.959103	0.059103
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

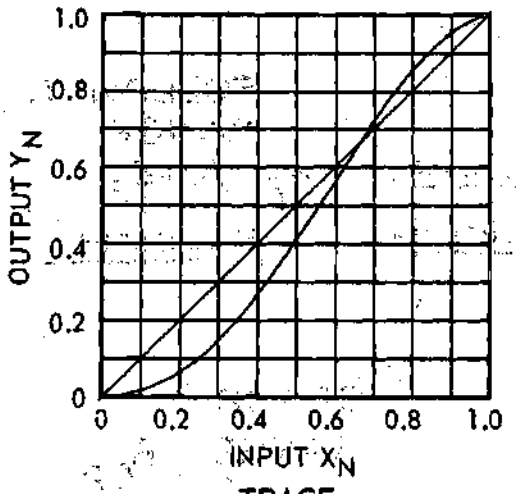


TRACE

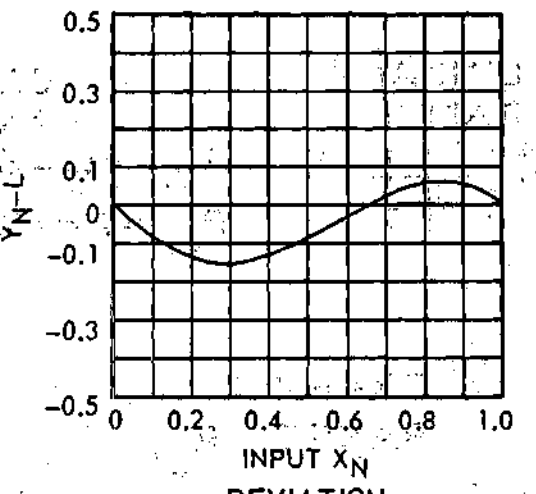


DEVIATION

CRANK RANGE RC1



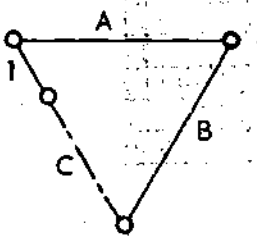
TRACE



DEVIATION

CRANK RANGE RC2

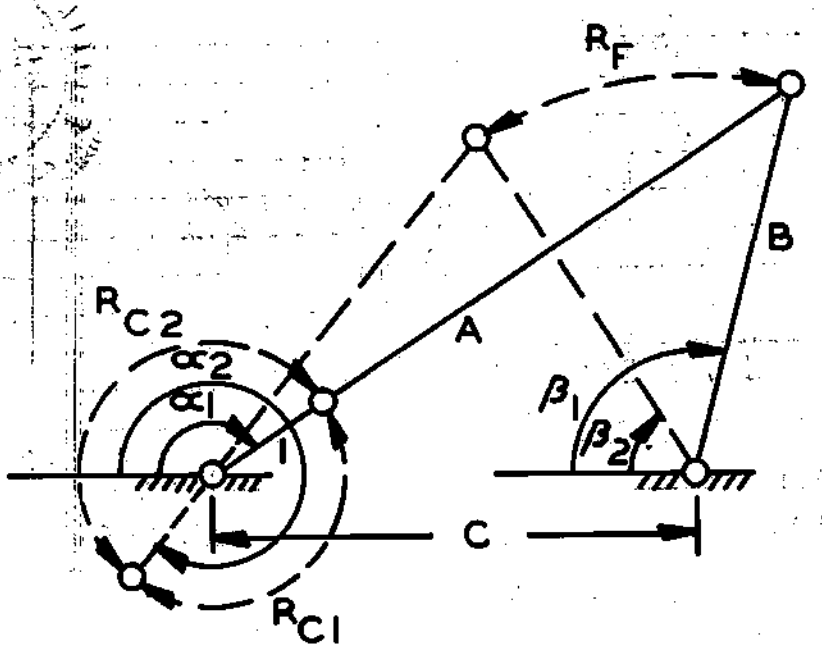
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 2.0

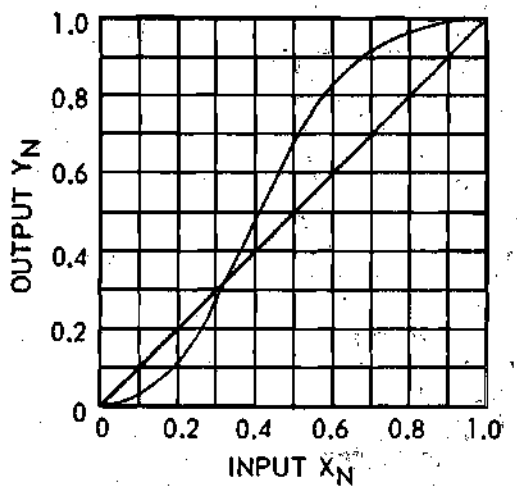
C = 2.5



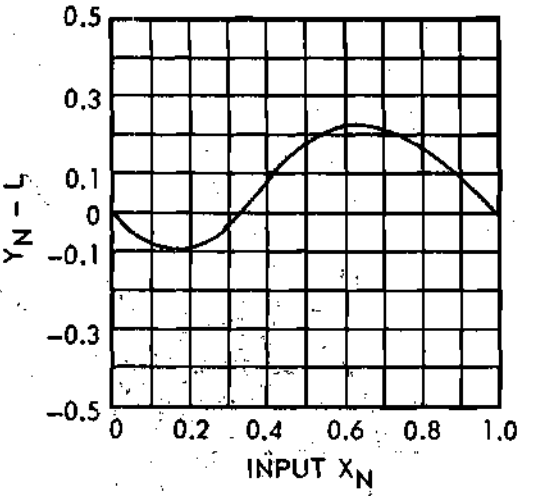
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.226362	$R_F = \beta_1 - \beta_2$
B = 2.5		
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 4.056823	= 1.055708

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.024126	-0.075874	0.017785	-0.082215
0.108083	-0.091917	0.064846	-0.135154
0.263068	-0.036932	0.137811	-0.162189
0.471491	0.071491	0.236695	-0.163305
0.675620	0.175620	0.360906	-0.139094
0.825698	0.225698	0.506324	-0.093677
0.917801	0.217801	0.663662	-0.036338
0.968719	0.168719	0.817529	0.017529
0.993131	0.093131	0.943601	0.043601
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

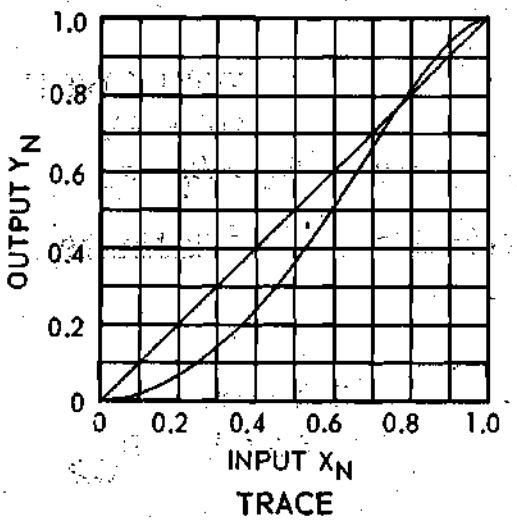


TRACE

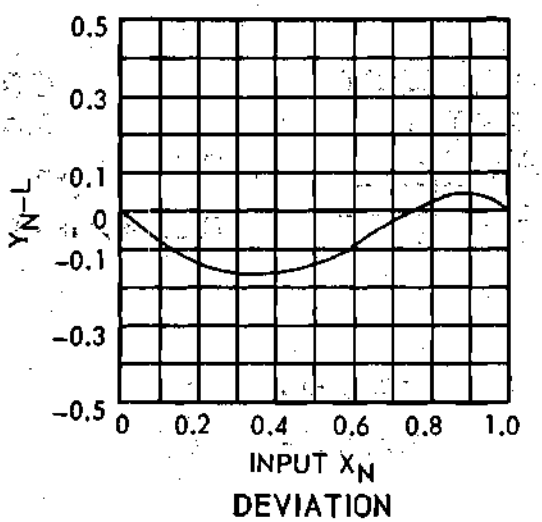


DEVIATION

CRANK RANGE RC1



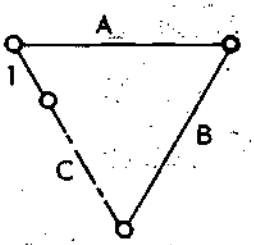
TRACE



DEVIATION

CRANK RANGE RC2

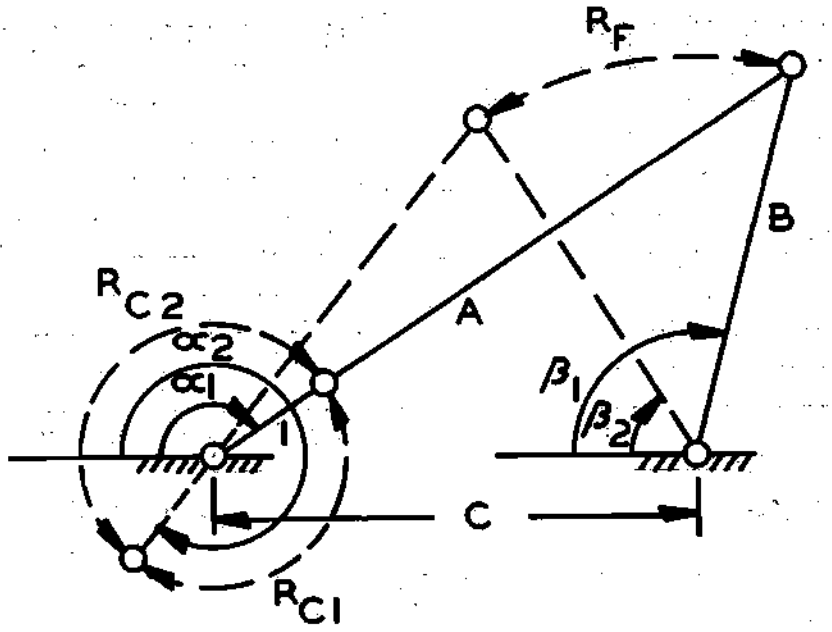
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 2.5

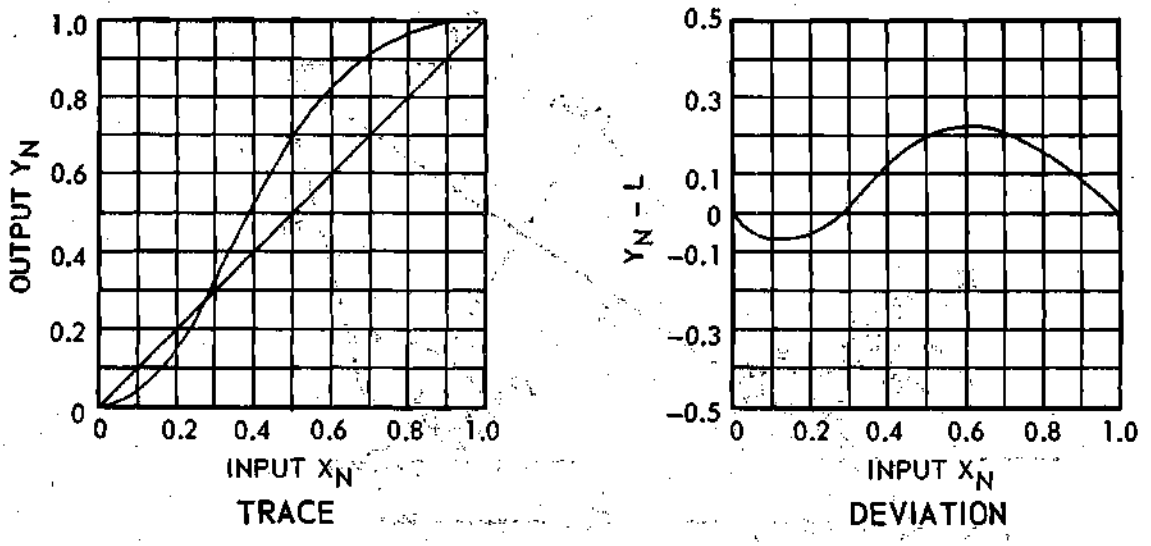
C = 2.0



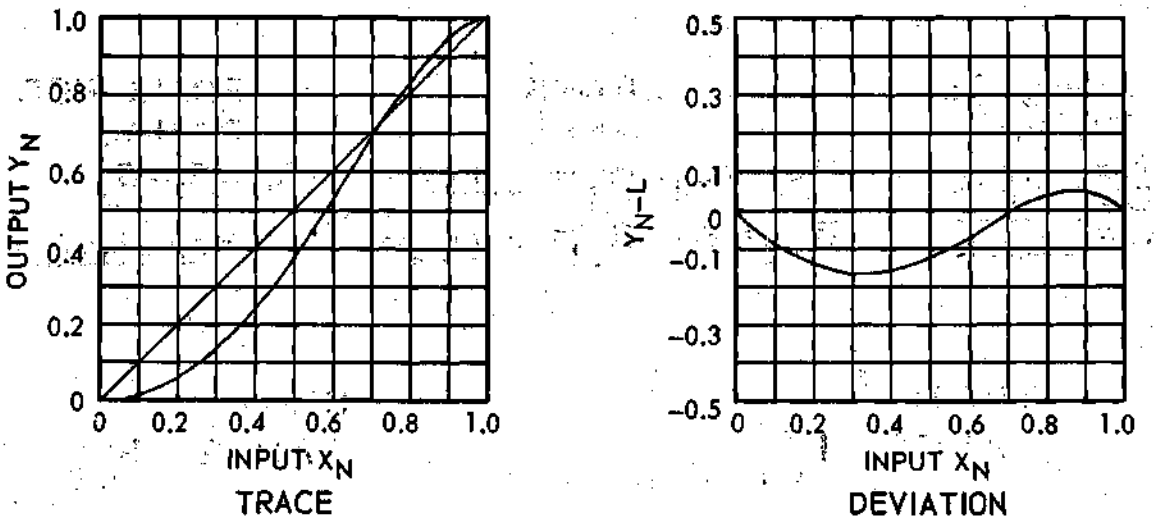
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.699449	$R_F = \beta_1 - \beta_2$
B = 2.5		
C = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.583736	= 0.884286

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033827	-0.066173	0.014491	-0.085509
0.142875	-0.057125	0.057950	-0.142050
0.319031	0.019031	0.132007	-0.167993
0.520100	0.120100	0.237767	-0.162233
0.695891	0.195891	0.372354	-0.127646
0.824756	0.224756	0.527153	-0.072847
0.910379	0.210379	0.688443	-0.011557
0.963101	0.163101	0.838203	0.038203
0.991277	0.091277	0.952852	0.052852
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

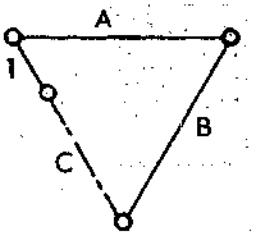


CRANK RANGE RC1



CRANK RANGE RC2

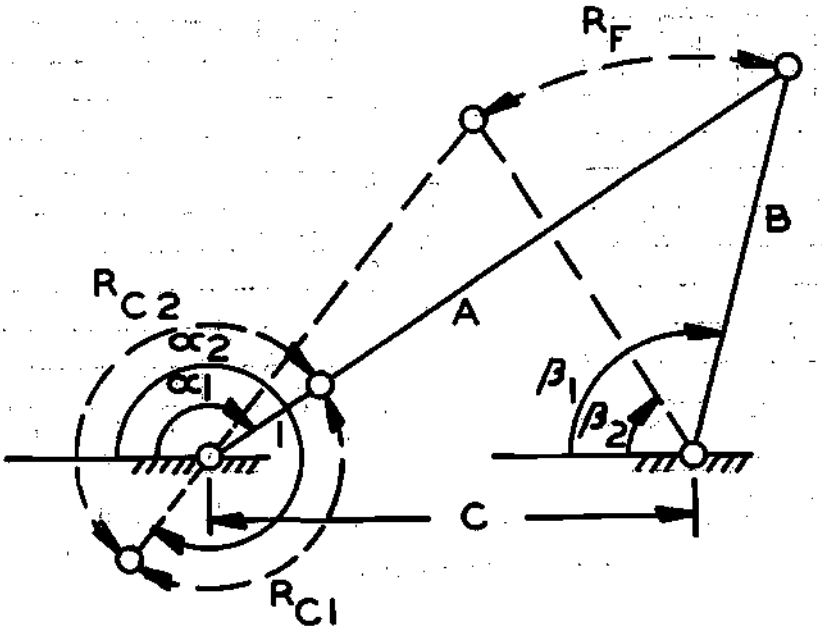
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 2.5

C = 2.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.105479	$R_F = \beta_1 - \beta_2$
B = 2.5		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.177707	= 0.823460

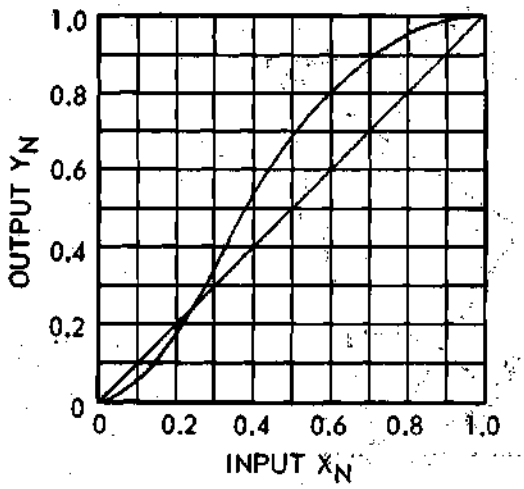
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.040740	-0.059260
0.163052	-0.036948
0.342149	0.042149
0.529825	0.129825
0.689030	0.189030
0.809443	0.209443
0.895389	0.195389
0.953509	0.153509
0.988083	0.088083
1.000000	0.000000

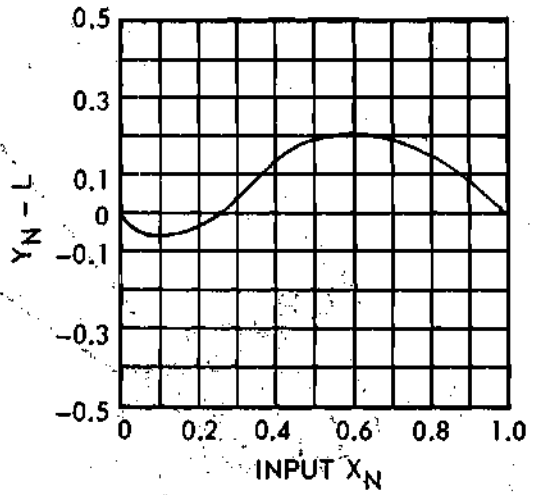
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.013999	-0.086001
0.060267	-0.139733
0.144286	-0.155714
0.265259	-0.134741
0.413410	-0.086590
0.573703	-0.026297
0.730028	0.030028
0.865861	0.065861
0.962852	0.062852
1.000000	0.000000

All angles measured in radians.

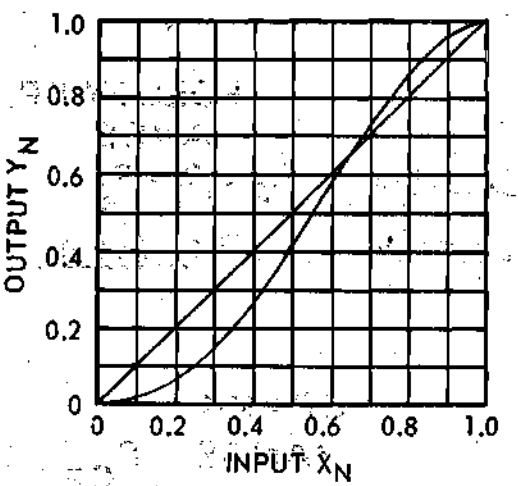


TRACE

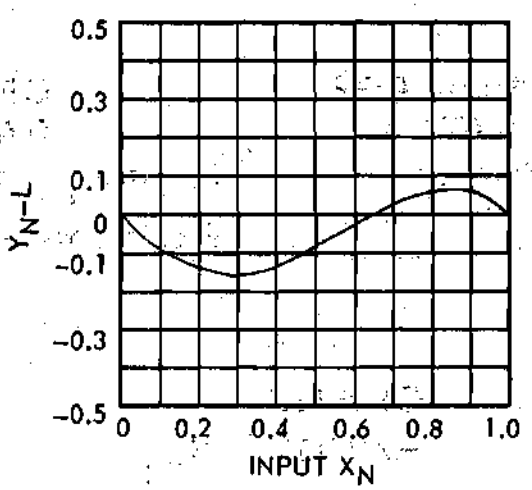


DEVIATION

CRANK RANGE RC1



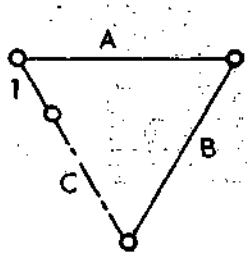
TRACE



DEVIATION

CRANK RANGE RC2

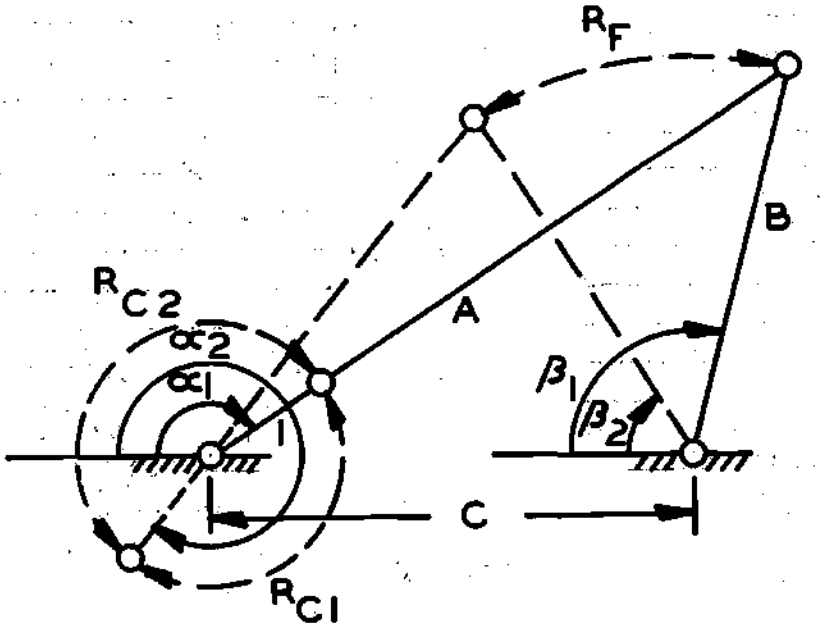
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 2.5

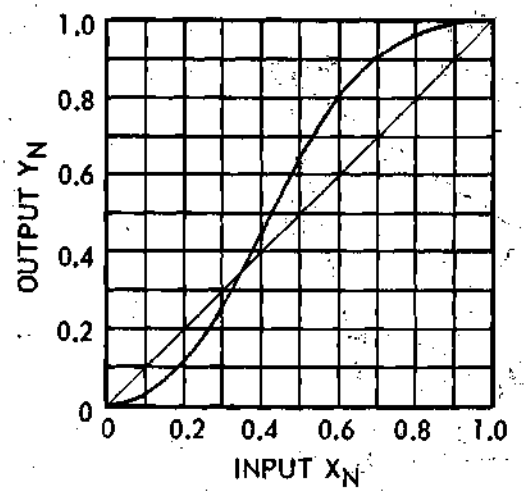
C = 3.0



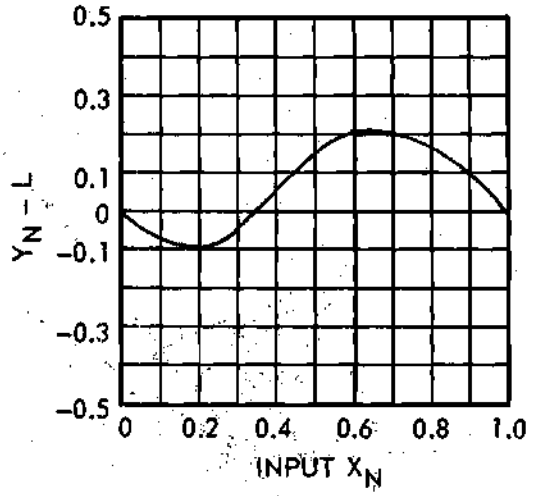
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.354246	$R_F = \beta_1 - \beta_2$
B = 3.0		
C = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.928939	= 0.823460

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.024478	-0.075522	0.017563	-0.082437
0.106243	-0.093757	0.064508	-0.135492
0.251372	-0.048628	0.137806	-0.162194
0.445161	0.045161	0.237740	-0.162260
0.644247	0.144247	0.363975	-0.136025
0.802383	0.202383	0.512219	-0.087781
0.905270	0.205270	0.672039	-0.027961
0.963730	0.163730	0.825955	0.025956
0.992019	0.092019	0.948040	0.048040
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

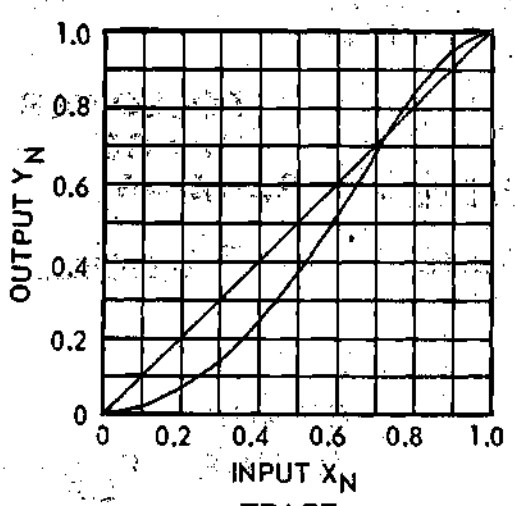


TRACE

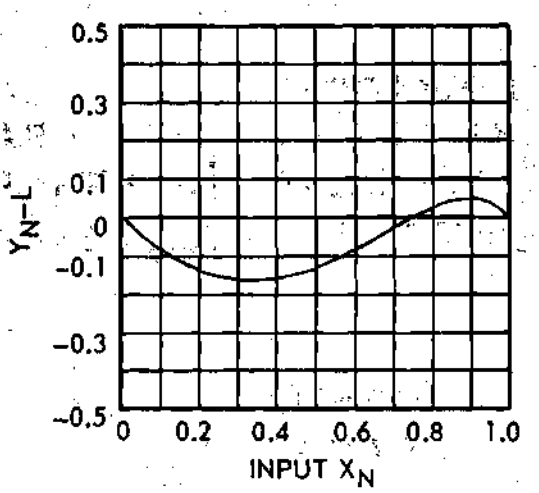


DEVIATION

CRANK RANGE RC1



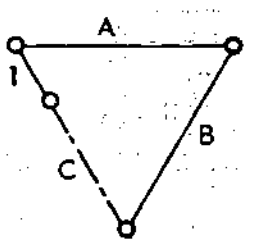
TRACE



DEVIATION

CRANK RANGE RC2

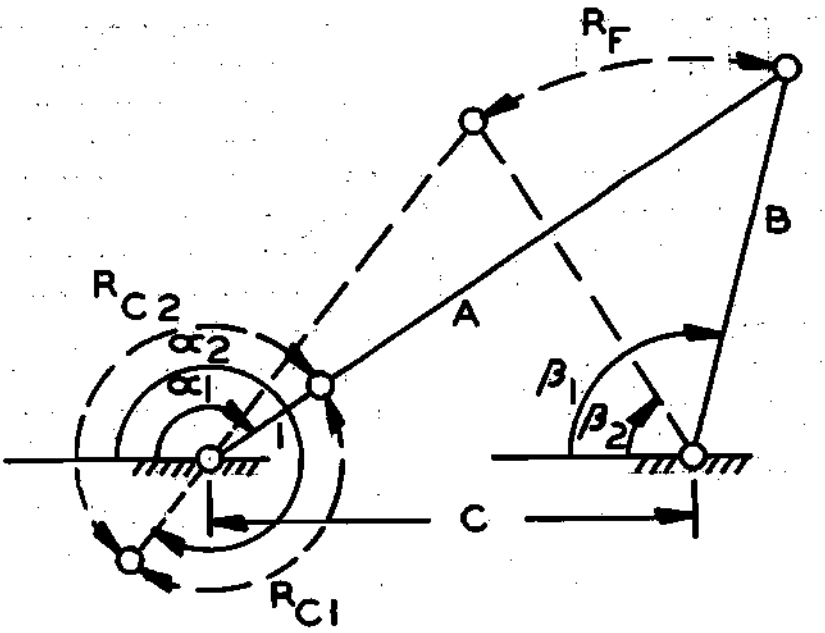
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 3.0

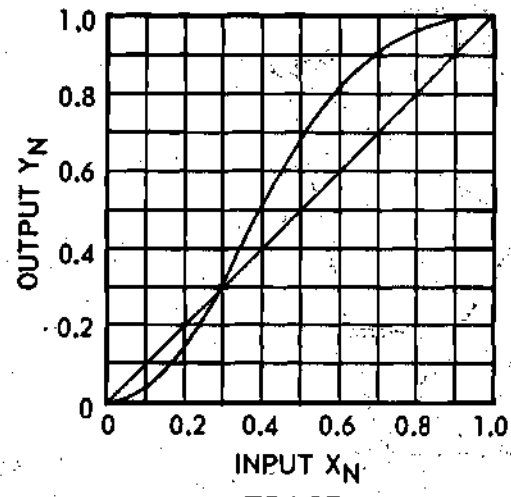
C = 2.5



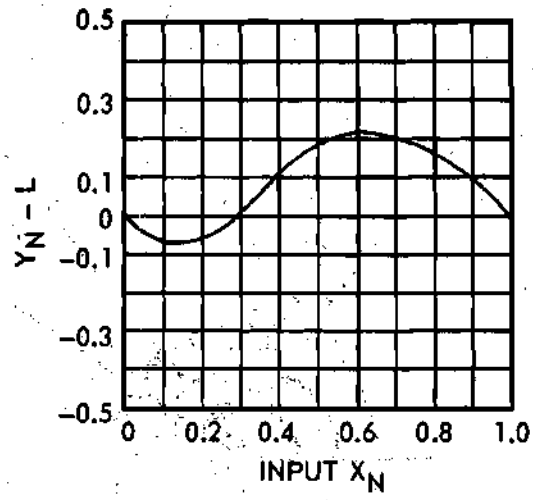
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.785442	$R_F = \beta_1 - \beta_2$
B = 3.0		= 0.712301
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.497742	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033674	-0.066326	0.014277	-0.085723
0.139351	-0.060649	0.057379	-0.142621
0.307566	0.007566	0.131353	-0.168647
0.502130	0.102130	0.237825	-0.162175
0.678320	0.178320	0.374272	-0.125728
0.812132	0.212132	0.531663	-0.068337
0.903152	0.203152	0.694900	-0.005100
0.959924	0.159924	0.844289	0.044289
0.990489	0.090489	0.955721	0.055721
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

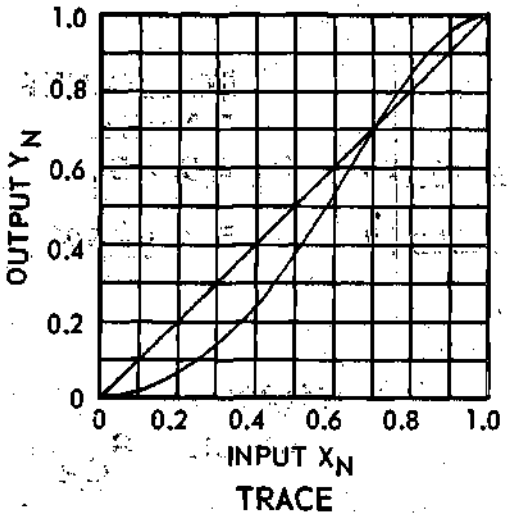


TRACE

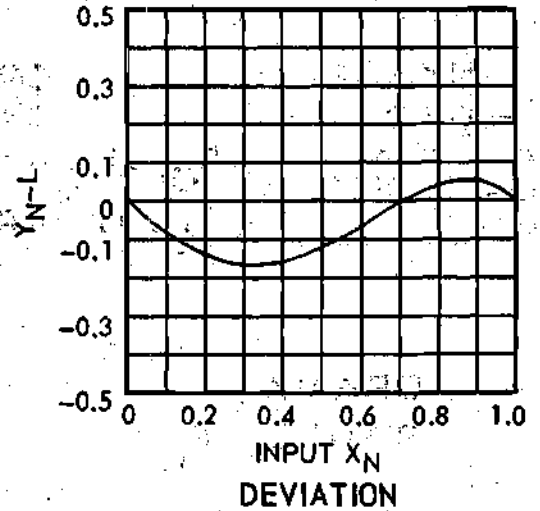


DEVIATION

CRANK RANGE RC1



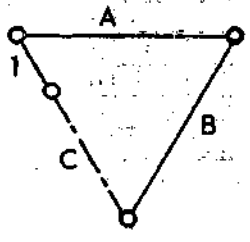
TRACE



DEVIATION

CRANK RANGE RC2

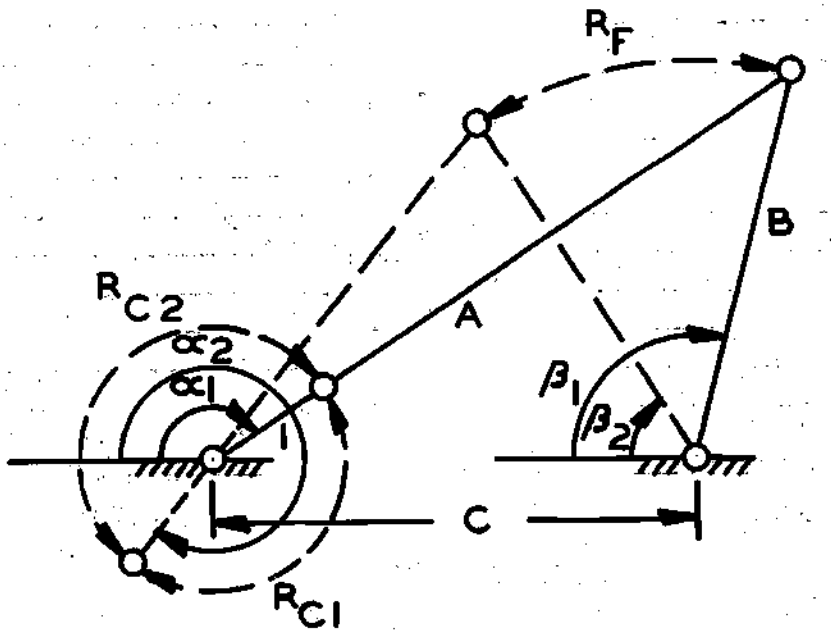
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 3.0

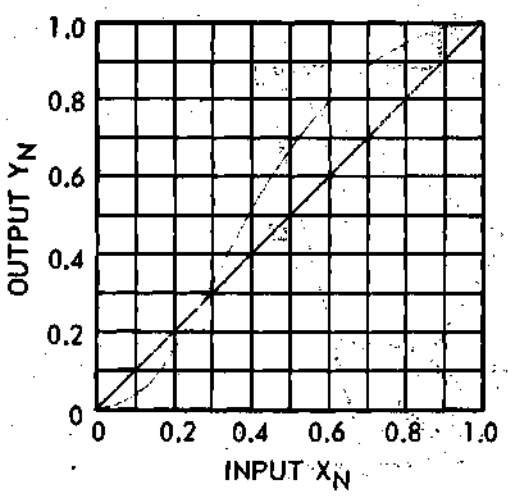
C = 3.0



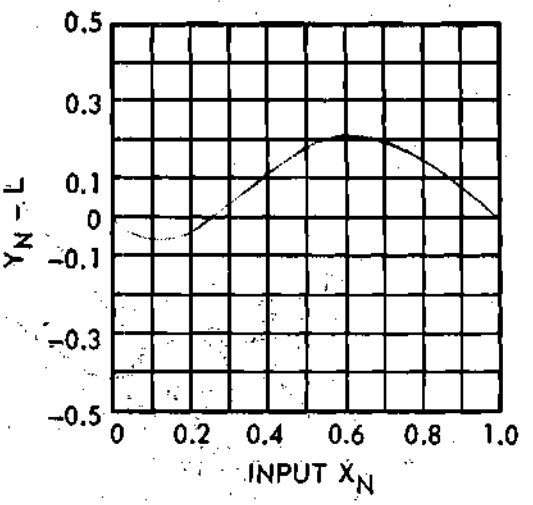
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.171226	$R_F = \beta_1 - \beta_2$
B = 3.0		= 0.679907
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.111959	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.040419	-0.059581	0.013743	-0.086257
0.159591	-0.040409	0.059446	-0.140554
0.333274	0.033274	0.143215	-0.156785
0.517808	0.117808	0.265104	-0.134896
0.677851	0.177851	0.415441	-0.084559
0.801193	0.201193	0.578154	-0.021846
0.890312	0.190312	0.735688	0.035688
0.951046	0.151046	0.870564	0.070564
0.987396	0.087396	0.964797	0.064797
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

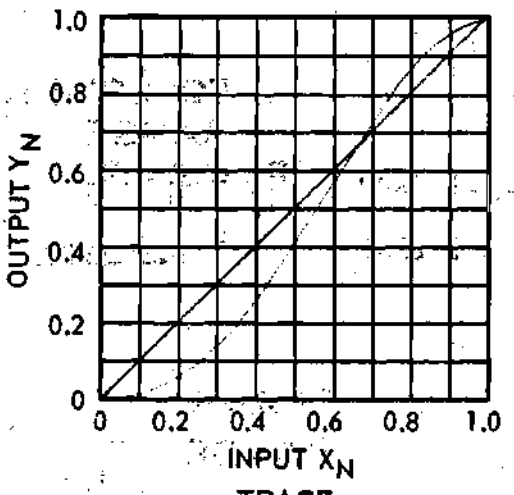


TRACE

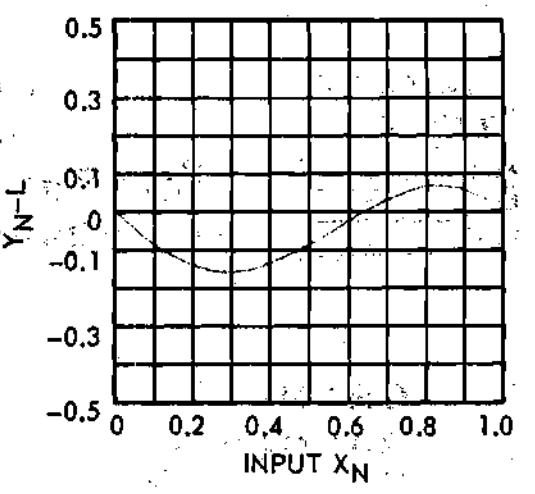


DEVIATION

CRANK RANGE RC1



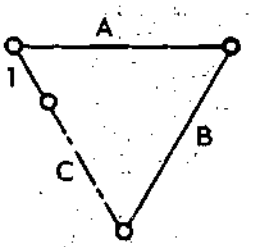
TRACE



DEVIATION

CRANK RANGE RC2

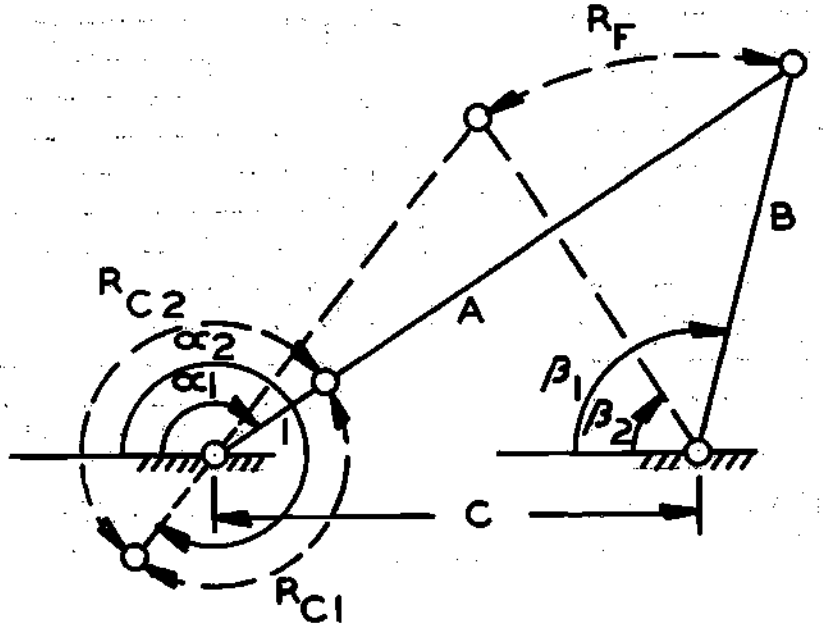
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 3.0

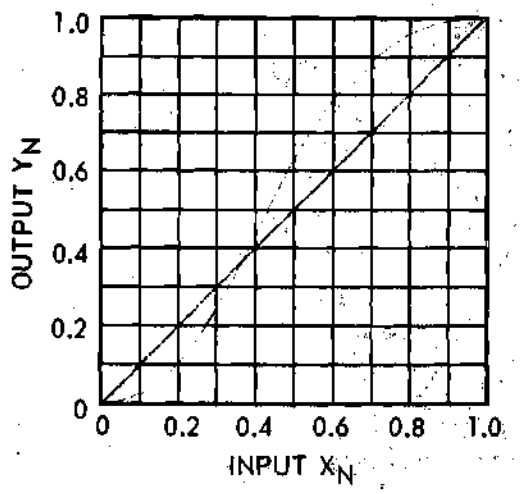
C = 3.5



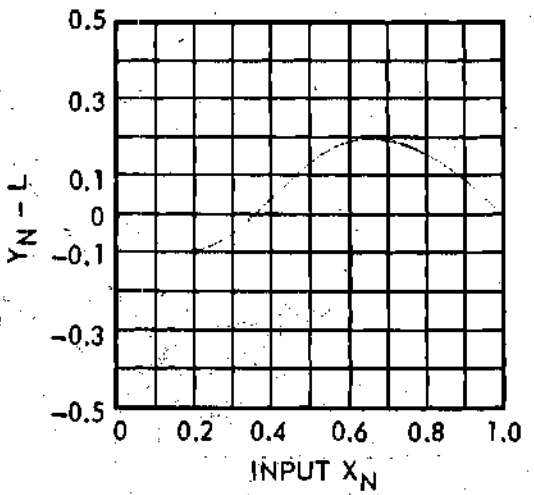
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.432053	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.851133	= 0.679907

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.024902	-0.075098	0.017345	-0.082655
0.106212	-0.093788	0.064022	-0.135978
0.247292	-0.052708	0.137270	-0.162730
0.433954	0.033954	0.237590	-0.162410
0.628904	0.128904	0.364878	-0.135122
0.789602	0.189602	0.514804	-0.085197
0.897894	0.197894	0.676227	-0.023773
0.960681	0.160681	0.830348	0.030348
0.991326	0.091326	0.950327	0.050327
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

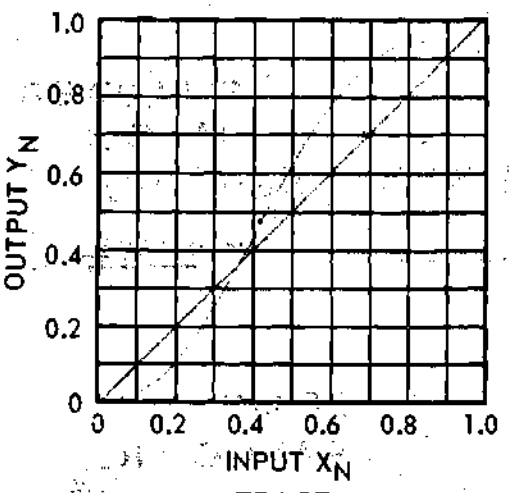


TRACE

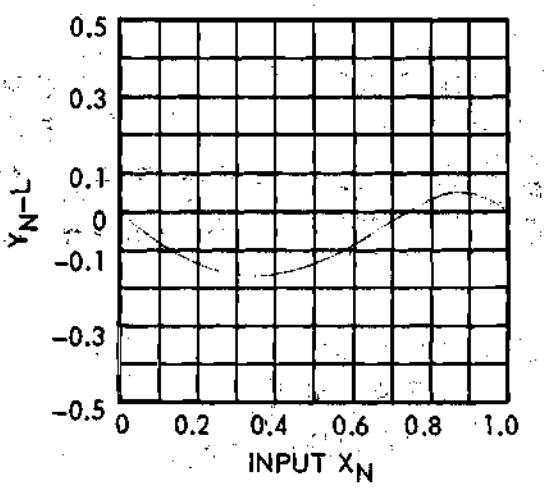


DEVIATION

CRANK RANGE RC1



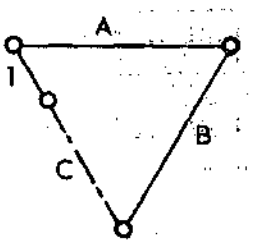
TRACE



DEVIATION

CRANK RANGE RC2

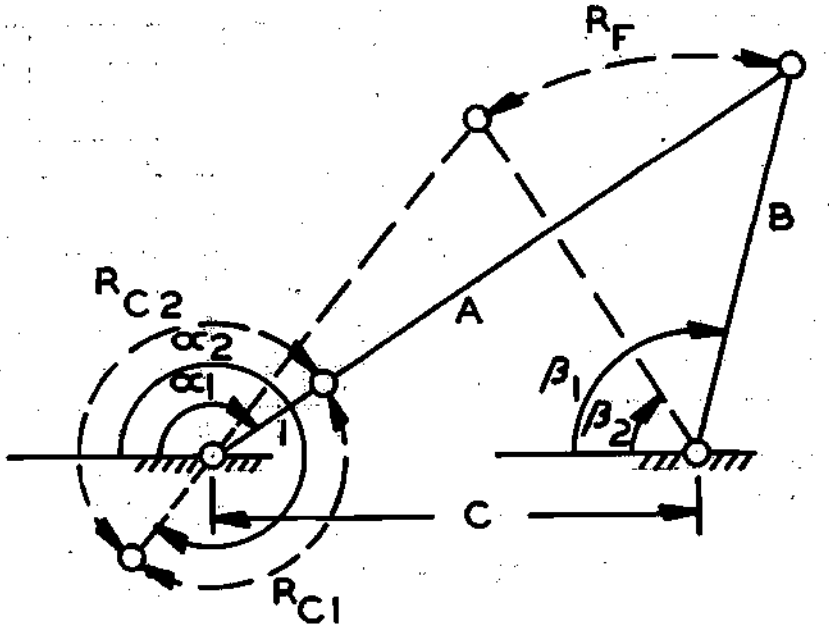
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 3.5

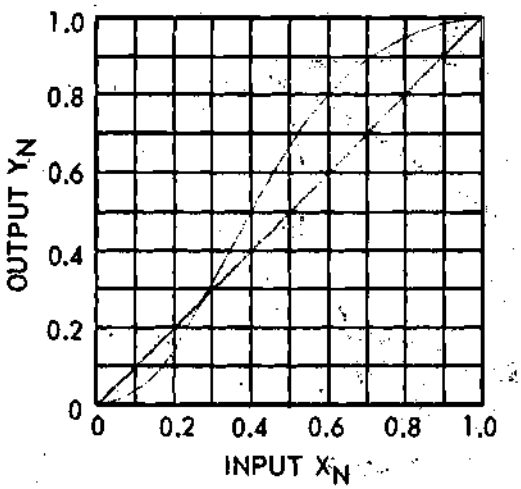
C = 3.0



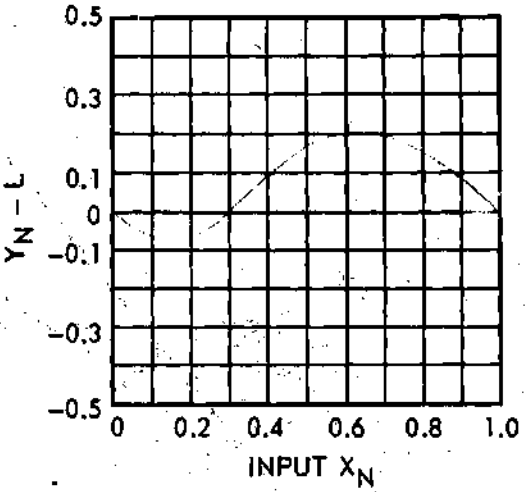
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.842029	$R_F = \beta_1 - \beta_2$
B = 3.5		= 0.599127
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.441156	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033779	-0.066221	0.014087	-0.085913
0.138000	-0.062000	0.056818	-0.143182
0.302077	0.002077	0.130537	-0.169463
0.492622	0.092622	0.237268	-0.162732
0.668282	0.168282	0.374804	-0.125196
0.804516	0.204516	0.533894	-0.066106
0.898638	0.198638	0.698504	-0.001496
0.957894	0.157894	0.847795	0.047795
0.989977	0.089977	0.957360	0.057360
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

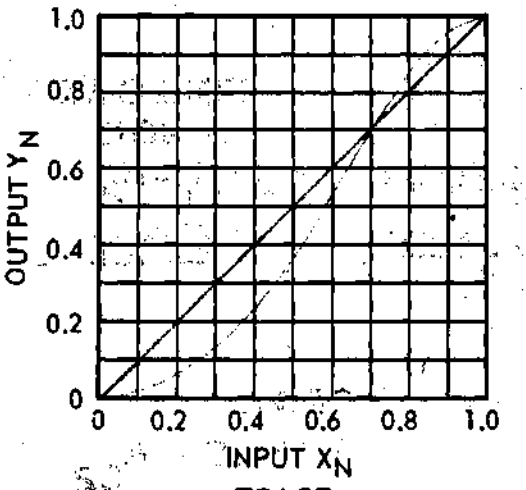


TRACE

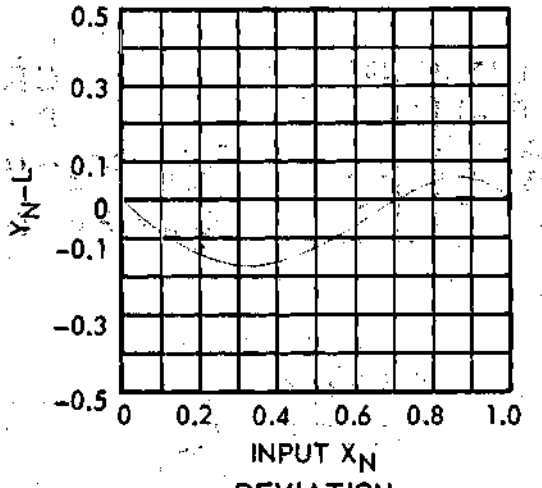


DEVIATION

CRANK RANGE RG1



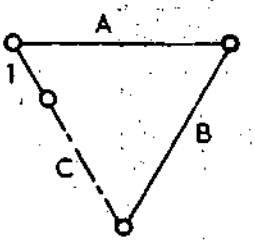
TRACE



DEVIATION

CRANK RANGE RG2

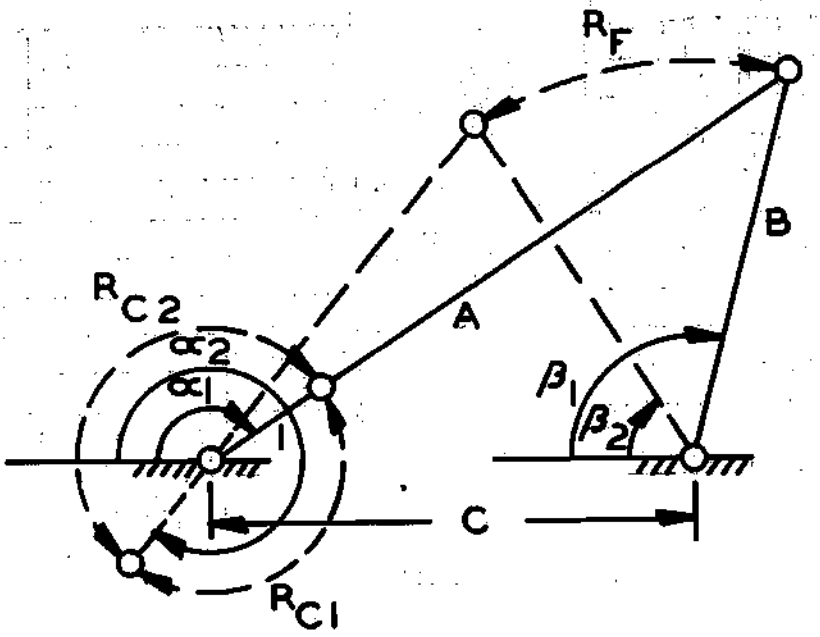
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 3.5

C = 3.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.217228	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.065957	= 0.580781

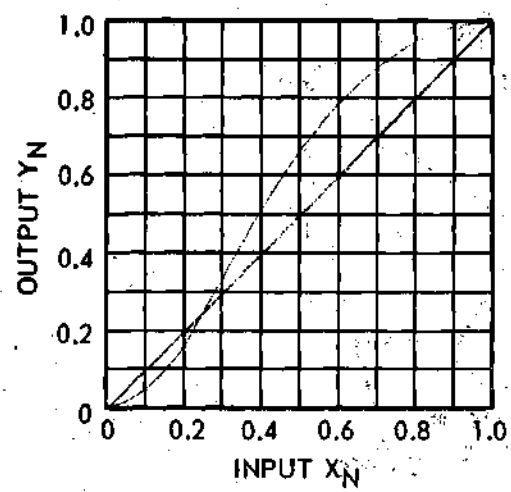
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.040374	-0.059626
0.157922	-0.042078
0.328398	0.028398
0.510734	0.110734
0.670941	0.170941
0.795922	0.195922
0.886994	0.186994
0.949408	0.149408
0.986931	0.086931
1.000000	0.000000

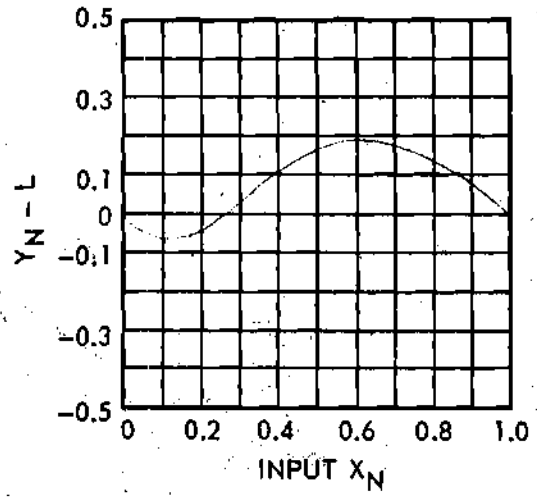
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.013530	-0.086470
0.058725	-0.141275
0.142144	-0.157856
0.264509	-0.135491
0.416312	-0.083688
0.580751	-0.019249
0.739204	0.039204
0.873518	0.073518
0.966006	0.066006
1.000000	0.000000

All angles measured in radians

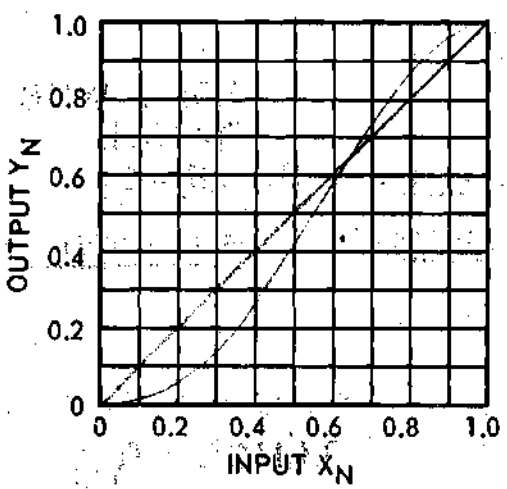


TRACE

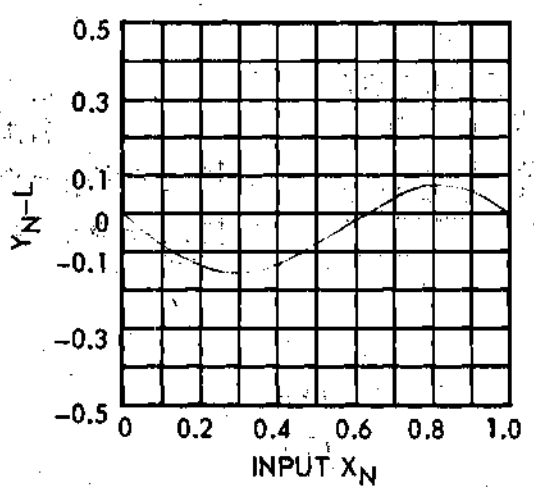


DEVIATION

CRANK RANGE RG1



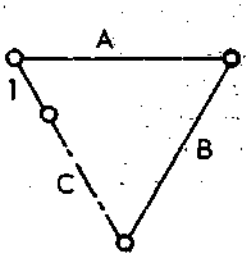
TRACE



DEVIATION

CRANK RANGE RG2

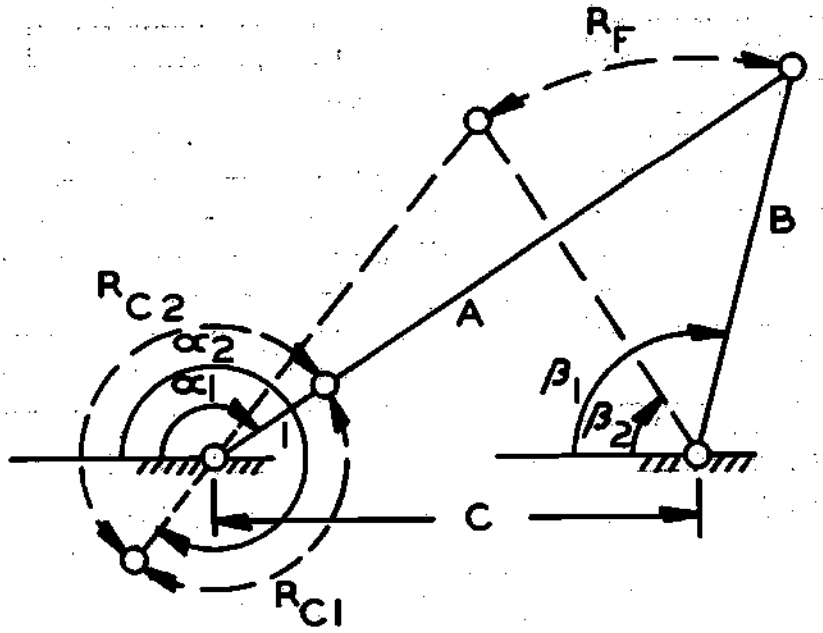
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 3.5

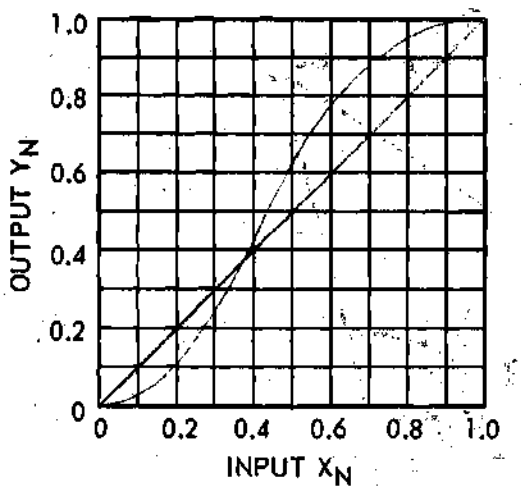
C = 4.0



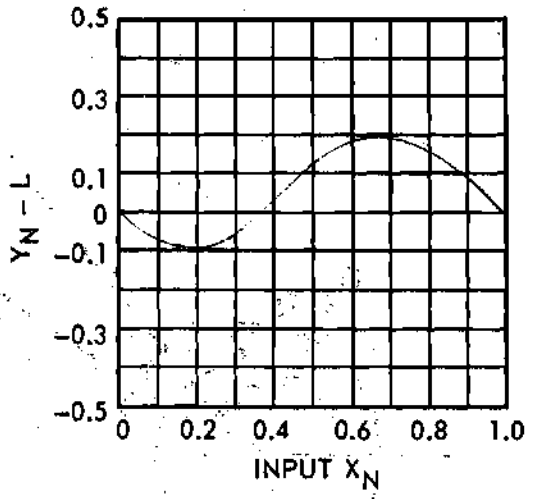
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.485176	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.798009	= 0.580781
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.025272	-0.074728	0.017158	-0.082842
0.106567	-0.093433	0.063558	-0.136442
0.245511	-0.054489	0.136648	-0.163352
0.427976	0.027976	0.237103	-0.162897
0.619956	0.119956	0.365018	-0.134982
0.781598	0.181598	0.516077	-0.083923
0.893044	0.193044	0.678662	-0.021338
0.958622	0.158622	0.833032	0.033032
0.990852	0.090852	0.951730	0.051730
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

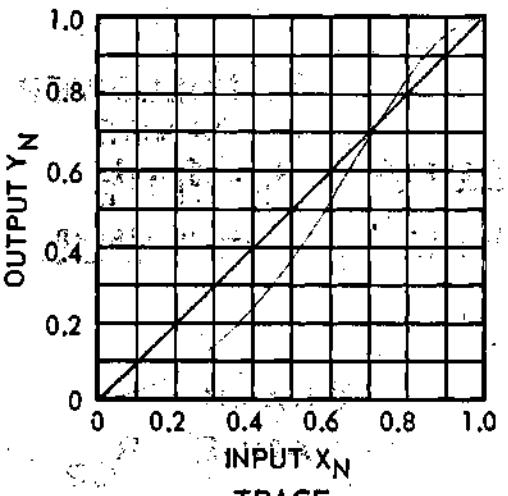


TRACE

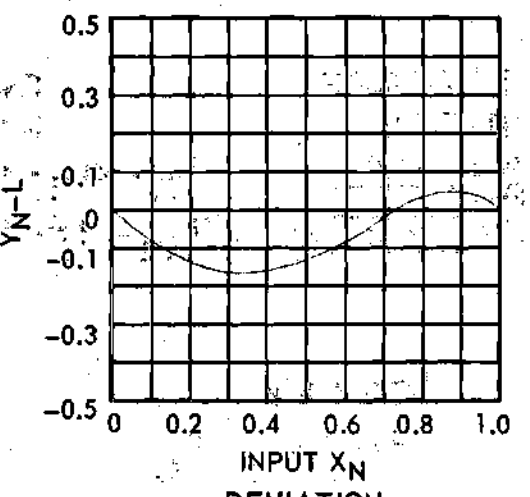


DEVIATION

CRANK RANGE RC1



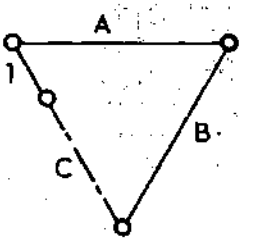
TRACE



DEVIATION

CRANK RANGE RC2

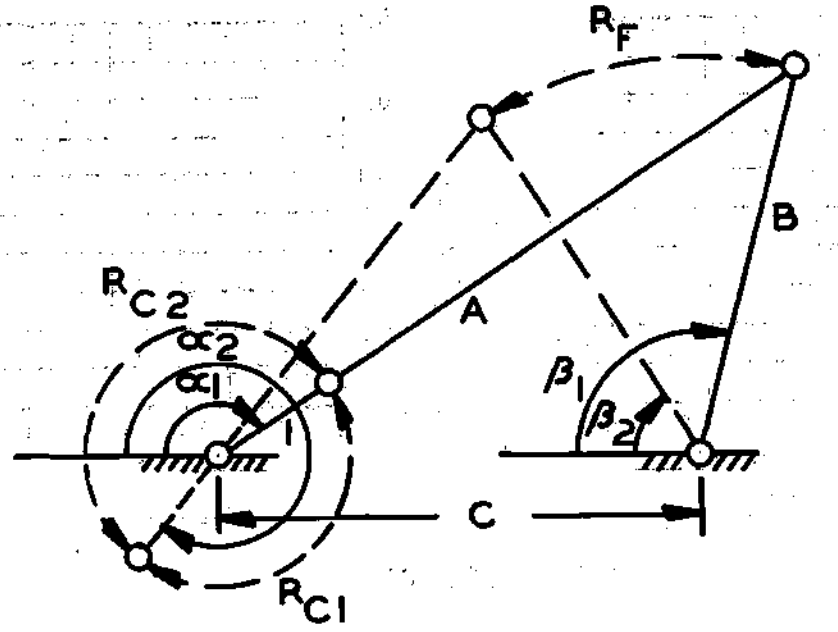
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 4.0

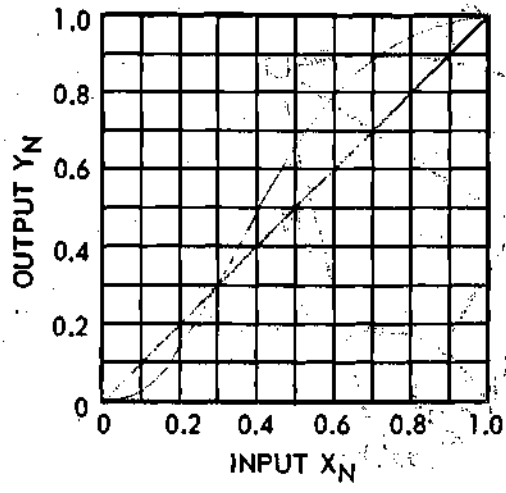
C = 3.5



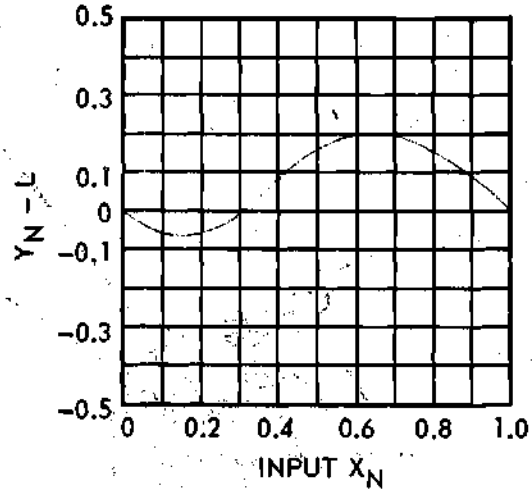
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.882524	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.400662	= 0.518138
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033942	-0.066058	0.013928	-0.086072
0.137423	-0.062577	0.056324	-0.143676
0.298987	-0.001013	0.129756	-0.170244
0.486828	0.086827	0.236559	-0.163441
0.661835	0.161835	0.374802	-0.125198
0.799436	0.199436	0.535111	-0.064889
0.895551	0.195551	0.700764	0.000764
0.956484	0.156484	0.850075	0.050075
0.989617	0.089616	0.958428	0.058428
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

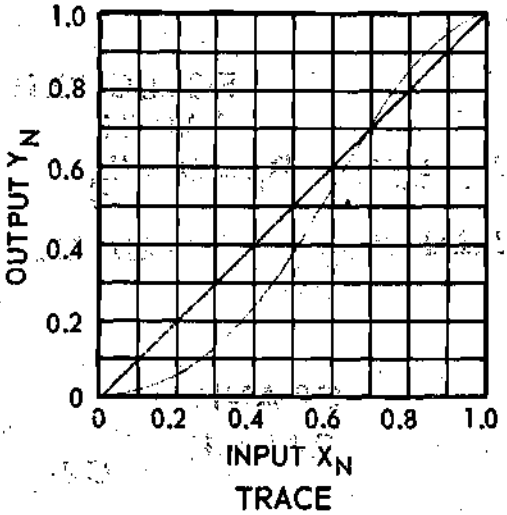


TRACE

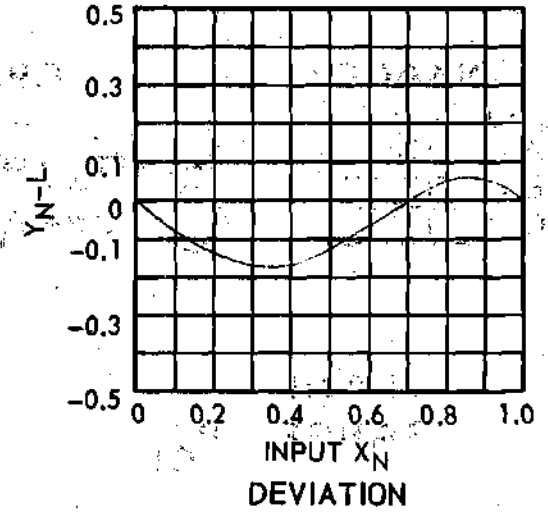


DEVIATION

CRANK RANGE RC1



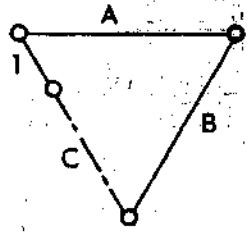
TRACE



DEVIATION

CRANK RANGE RC2

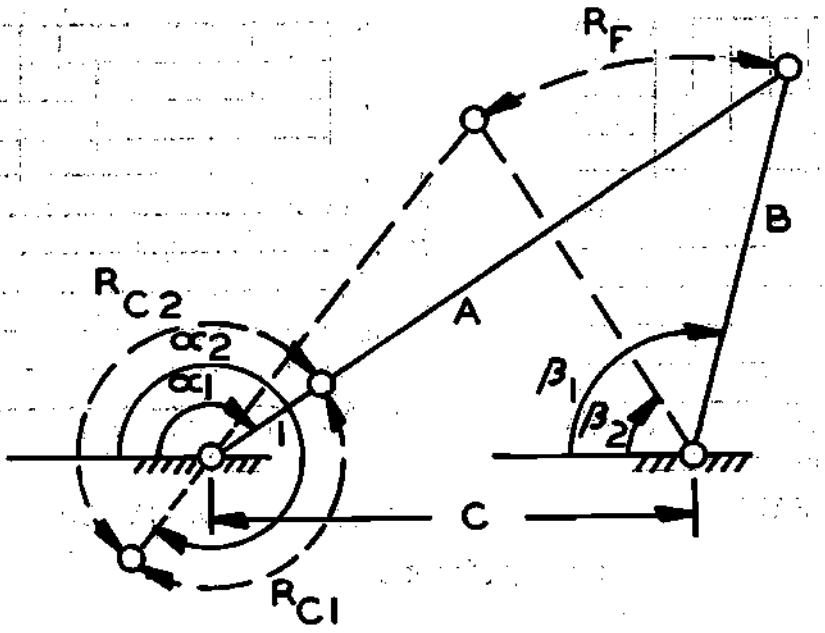
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 4.0

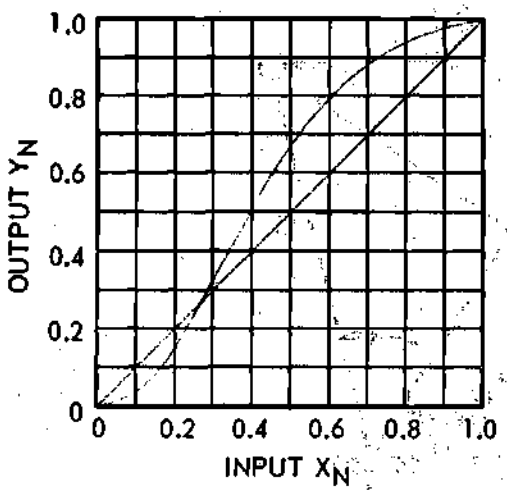
C = 4.0



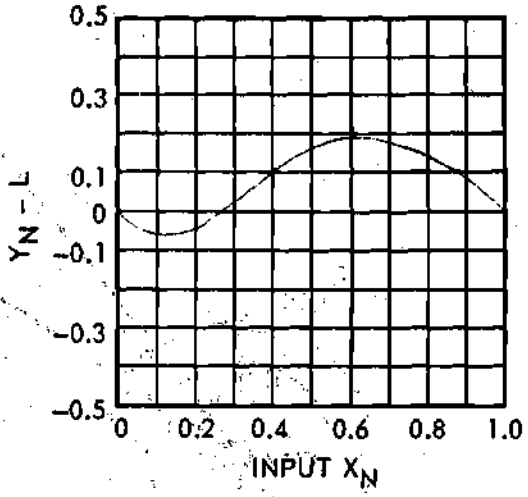
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.251479	$R_F = \beta_1 - \beta_2$
B = 4.0		
C = 4.5	$R_{C2} = 2\pi - R_{C1} =$ 3.031706	= 0.507692

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.040425	-0.059575	0.013354	-0.086646
0.157019	-0.042981	0.058113	-0.141887
0.325386	0.025386	0.141174	-0.158826
0.506119	0.106119	0.263800	-0.136200
0.666270	0.166270	0.416658	-0.083342
0.792271	0.192272	0.582408	-0.017592
0.884657	0.184657	0.741595	0.041595
0.948239	0.148239	0.875555	0.075555
0.986595	0.086595	0.966835	0.066835
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

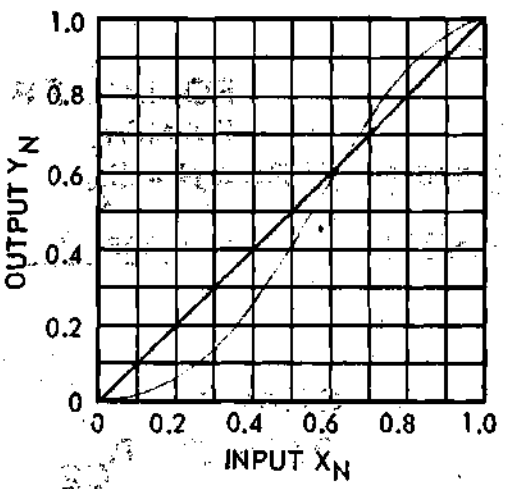


TRACE

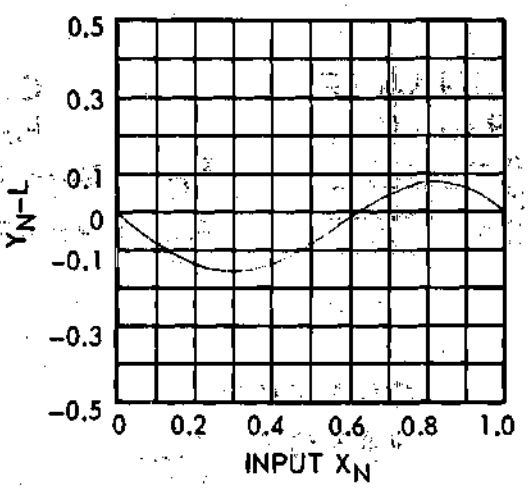


DEVIATION

CRANK RANGE RG1



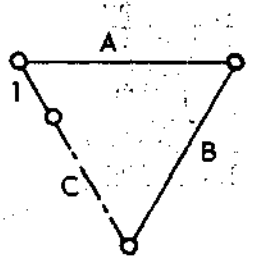
TRACE



DEVIATION

CRANK RANGE RG2

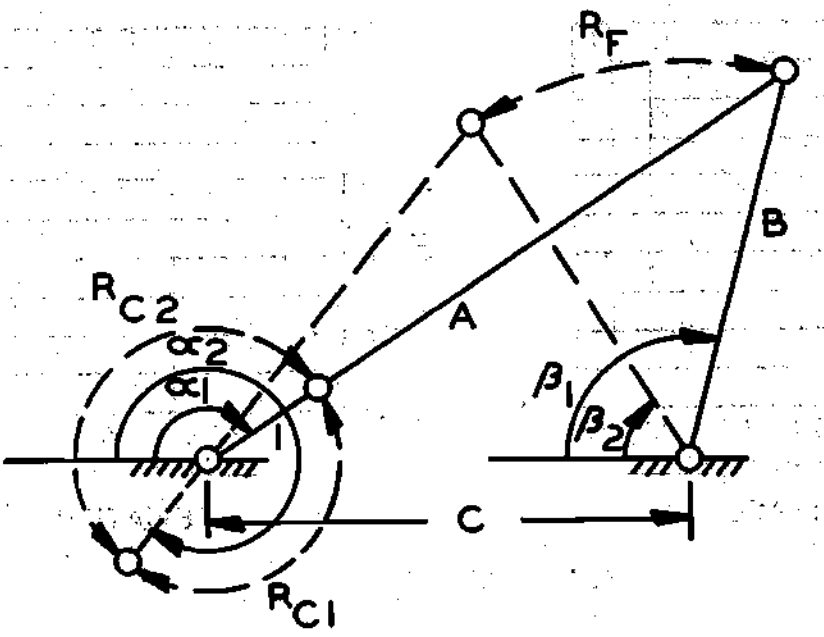
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.0

B = 4.0

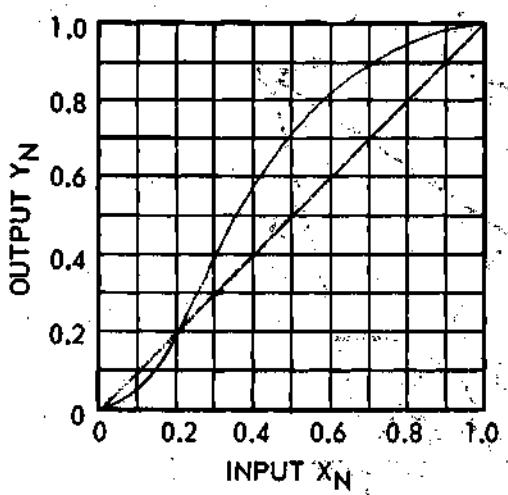
C = 4.5



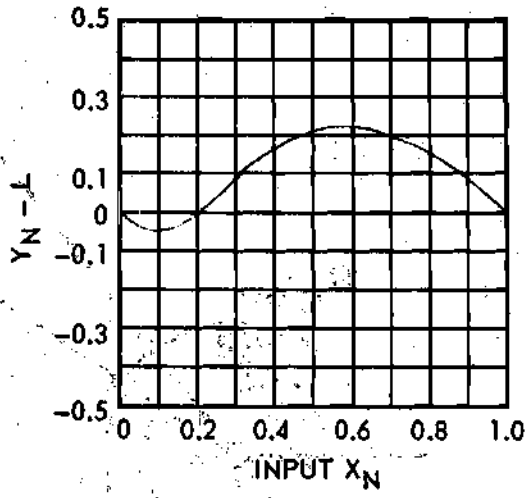
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.936158	$R_F = \beta_1 - \beta_2$
B = 1.5		= 1.508710
C = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.347027	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.048346	-0.051654	0.017032	-0.082968
0.194217	-0.005783	0.070895	-0.129105
0.388007	0.088007	0.161186	-0.138814
0.568206	0.168206	0.280567	-0.119433
0.711707	0.211707	0.418573	-0.081427
0.819741	0.219741	0.565290	-0.034710
0.898886	0.198887	0.711566	0.011566
0.954266	0.154266	0.846688	0.046688
0.988160	0.088160	0.953561	0.053561
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

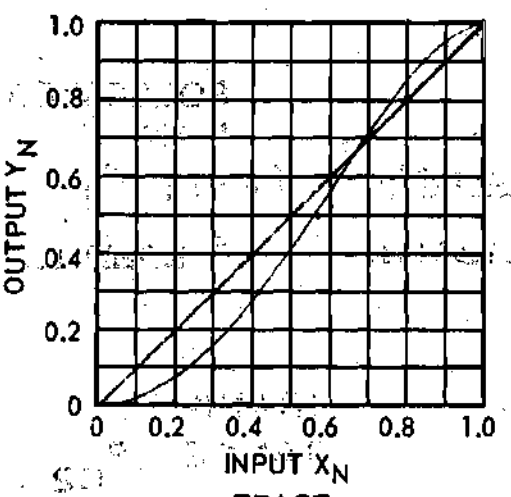


TRACE

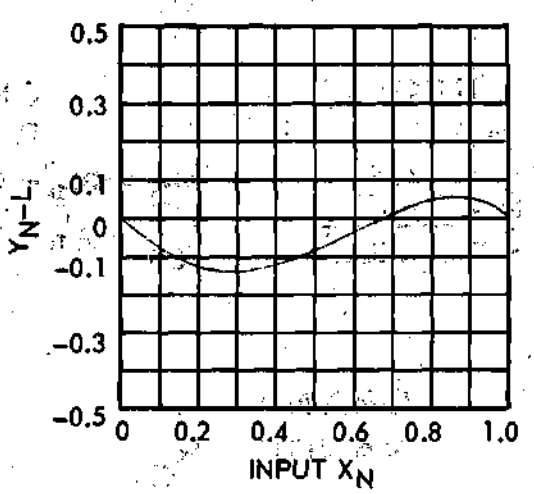


DEVIATION

CRANK RANGE RC1



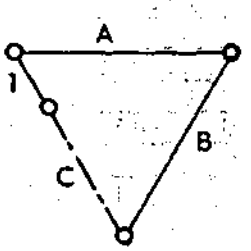
TRACE



DEVIATION

CRANK RANGE RC2

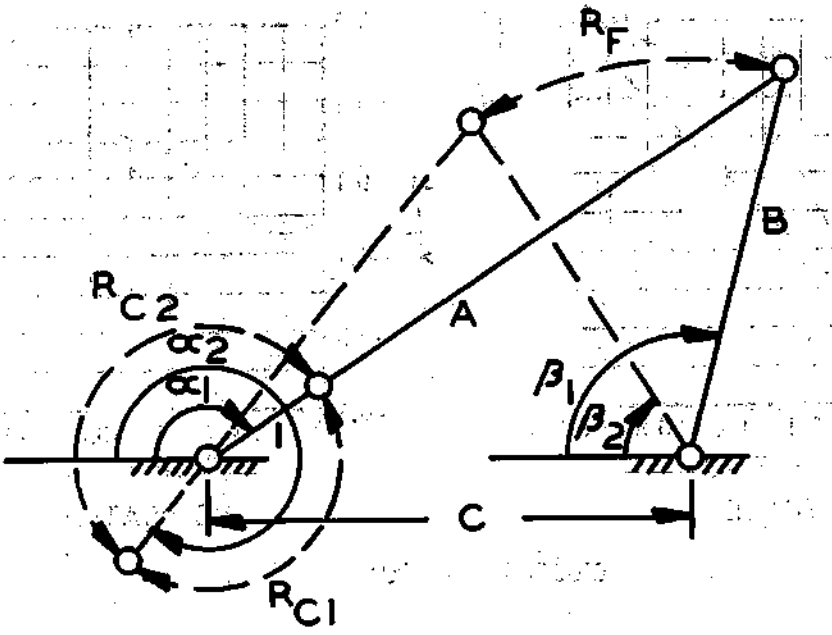
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 1.5

C = 2.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.460554	$R_F = \beta_1 - \beta_2$
B = 2.0		
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.822632	= 1.362078

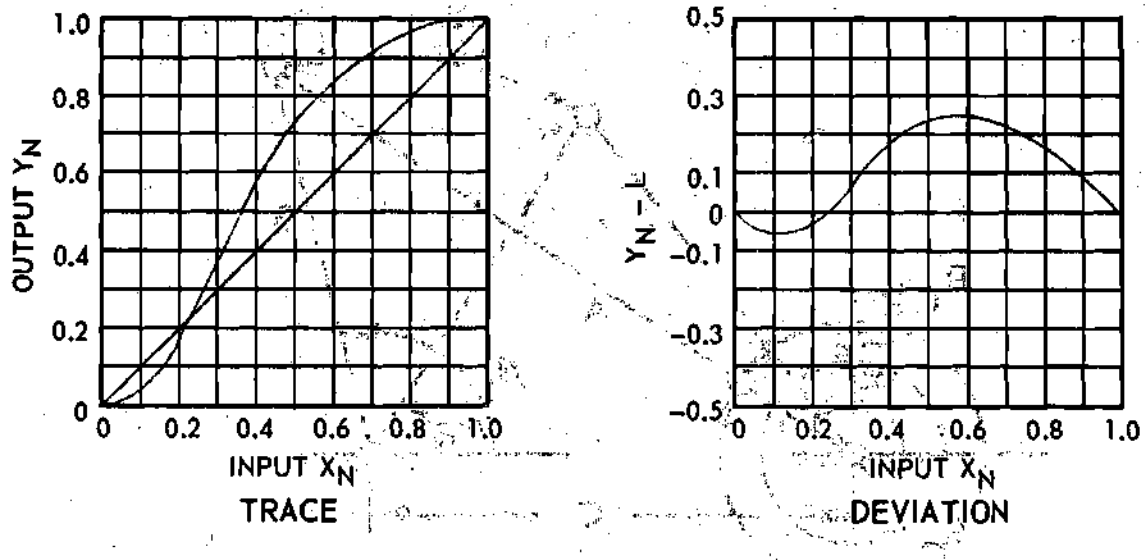
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.037943	-0.062057
0.168239	-0.031761
0.371749	0.071749
0.576957	0.176957
0.737249	0.237248
0.848902	0.248901
0.922476	0.222476
0.968038	0.168038
0.992470	0.092470
1.000000	0.000000

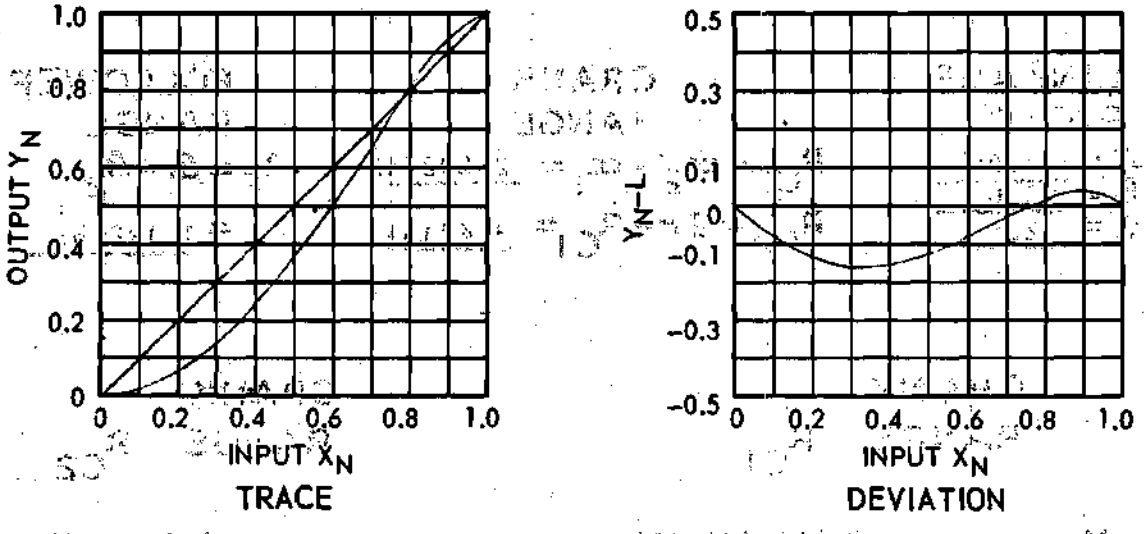
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.016515	-0.083485
0.063982	-0.136018
0.140661	-0.159339
0.244496	-0.155504
0.371471	-0.128529
0.515265	-0.084735
0.667351	-0.032649
0.815915	0.015915
0.941038	0.041038
1.000000	0.000000

All angles measured in radians.

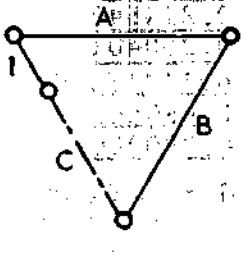


CRANK RANGE RC1



CRANK RANGE RC2

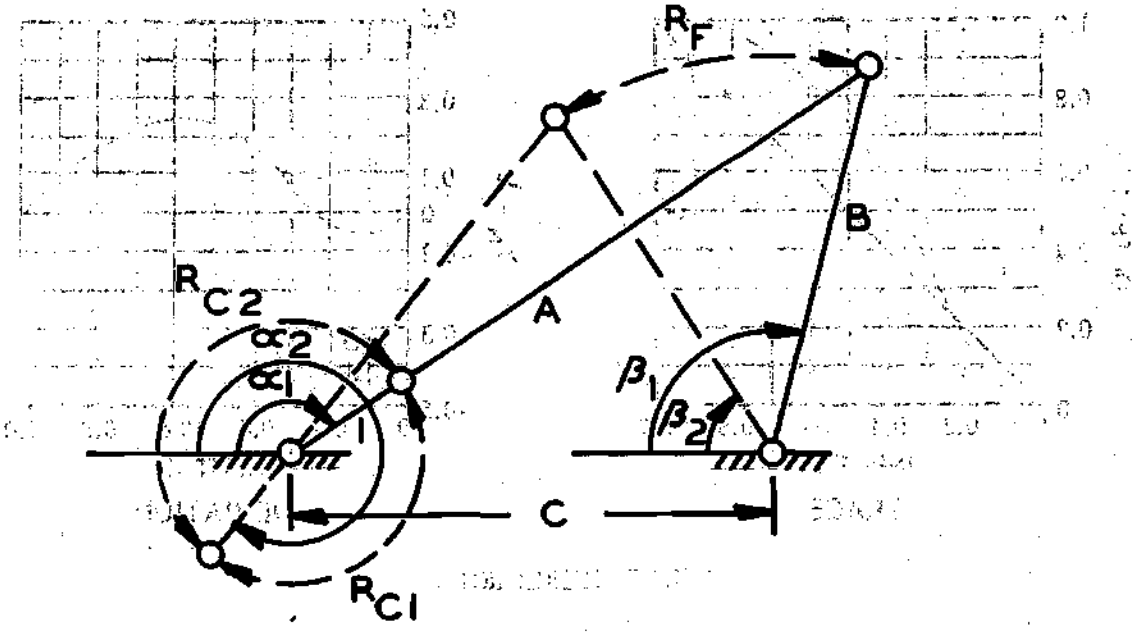
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.0

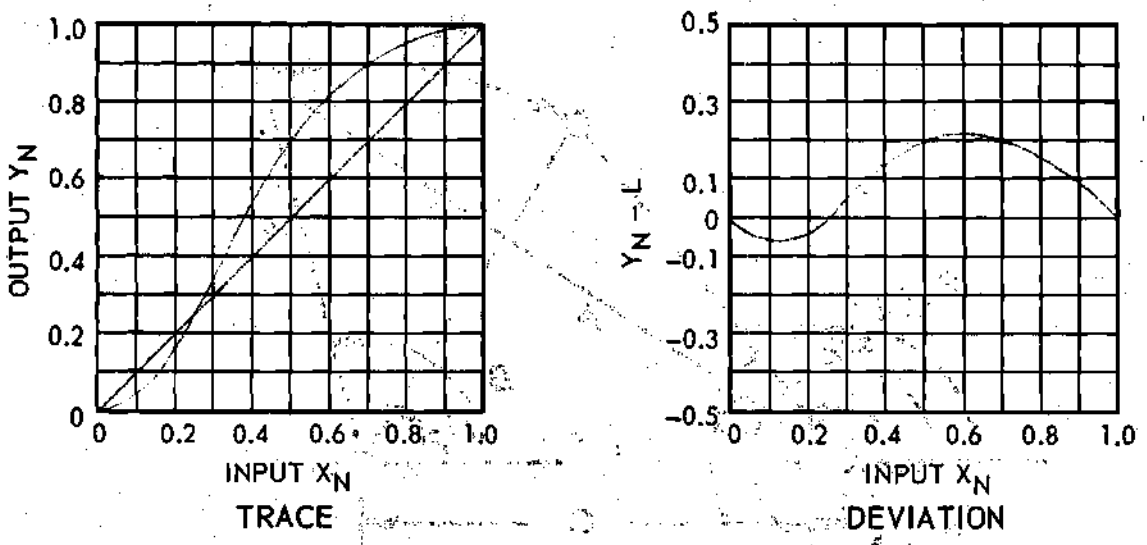
C = 2.0



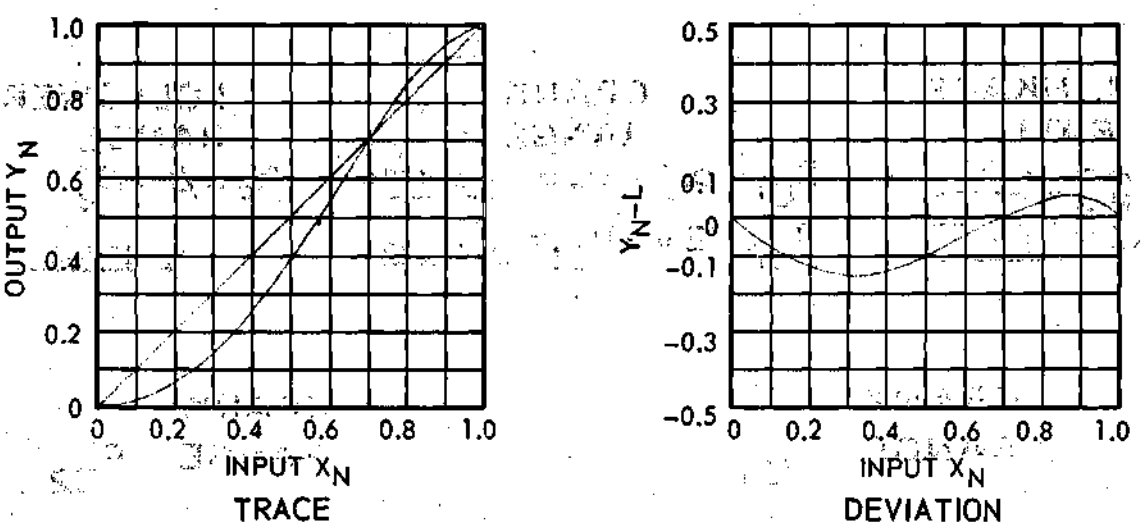
LINKAGE RATIO		CRANK RANGE		FOLLOWER RANGE
A =	2.5	$R_{C1} = \alpha_2 - \alpha_1 =$	2.808542	$R_F = \beta_1 - \beta_2$
B =	2.0			
C =	2.5	$R_{C2} = 2\pi - R_{C1} =$	3.474643	= 1.128653

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.038481	-0.061519	0.016134	-0.083866
0.159591	-0.040409	0.065209	-0.134791
0.341379	0.041379	0.147568	-0.152432
0.532055	0.132055	0.260556	-0.139444
0.693125	0.193125	0.397530	-0.102470
0.814546	0.214546	0.548808	-0.051192
0.900401	0.200401	0.702661	0.002661
0.957116	0.157116	0.844594	0.044594
0.989463	0.089463	0.954201	0.054201
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

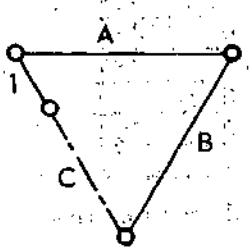


CRANK RANGE RC1



CRANK RANGE RC2

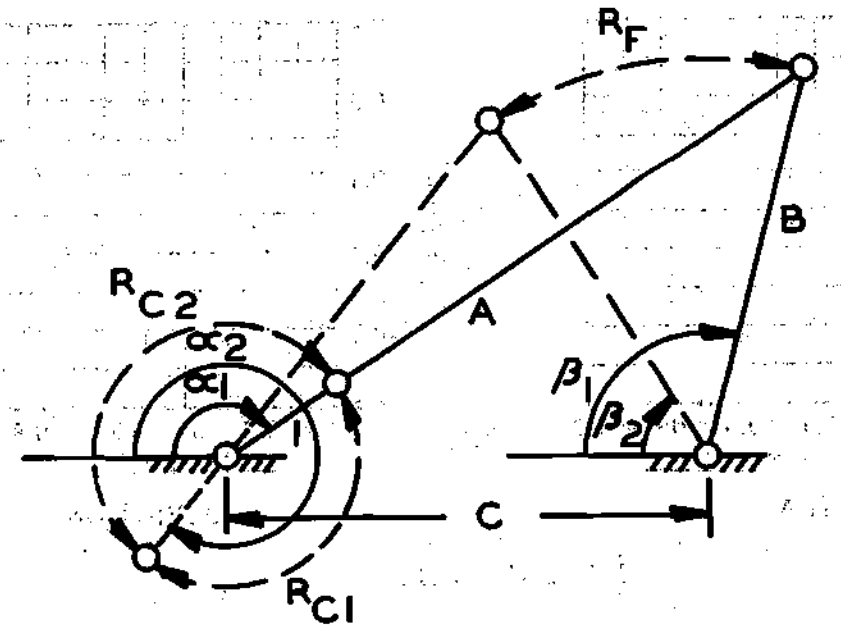
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.0

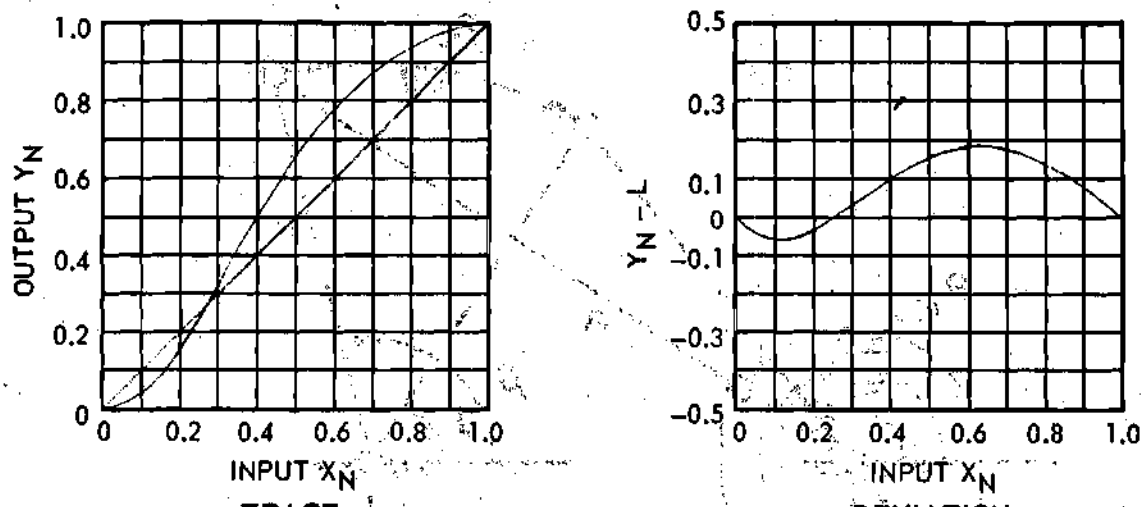
C = 2.5



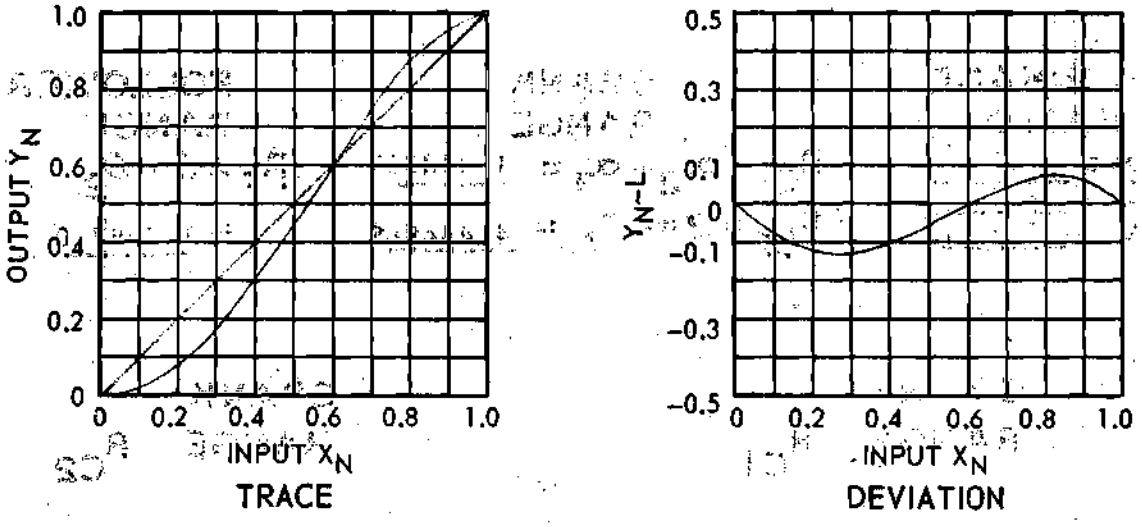
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.114294	$R_F = \beta_1 - \beta_2$
B = 2.0		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.168892	= 1.047762

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.039936	-0.060064	0.017255	-0.082745
0.158485	-0.041515	0.072684	-0.127316
0.328641	0.028641	0.167423	-0.132577
0.506215	0.106215	0.294479	-0.105521
0.661059	0.161059	0.441510	-0.058490
0.784246	0.184246	0.595341	-0.004659
0.877387	0.177387	0.743268	0.043268
0.943893	0.143893	0.871745	0.071745
0.985295	0.085294	0.964222	0.064222
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

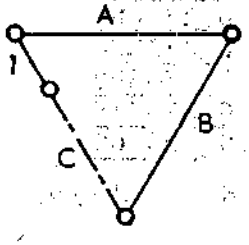


CRANK RANGE RC1



CRANK RANGE RC2

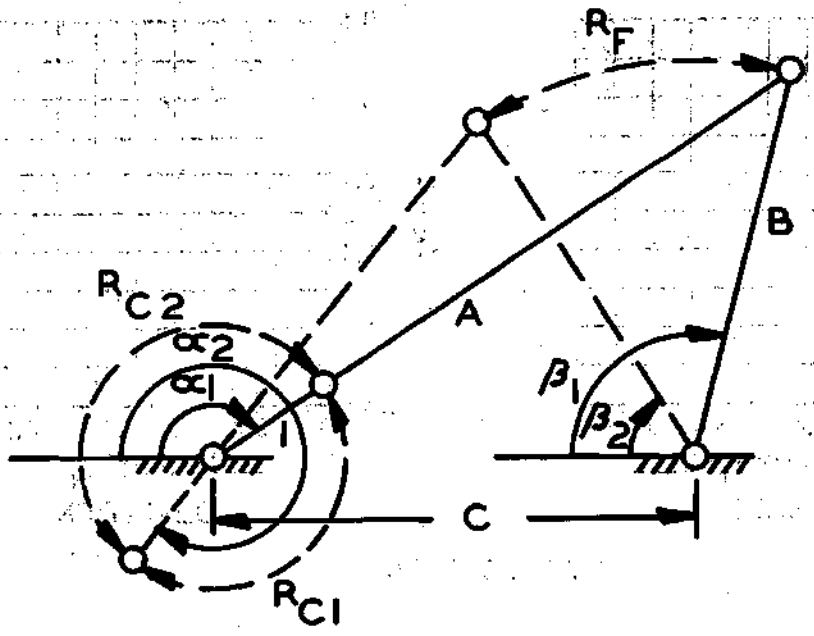
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.0

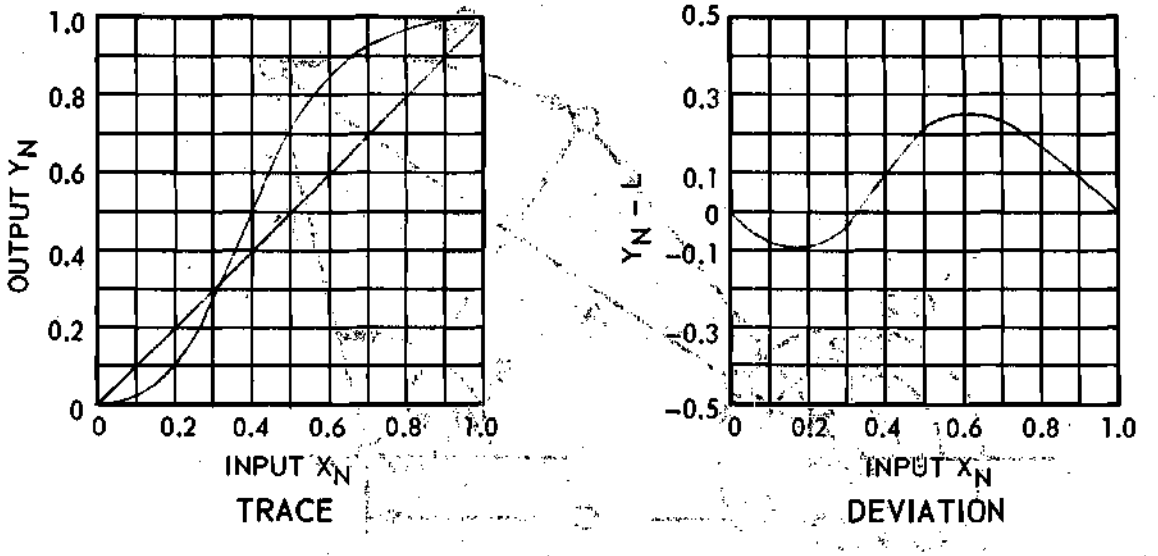
C = 3.0



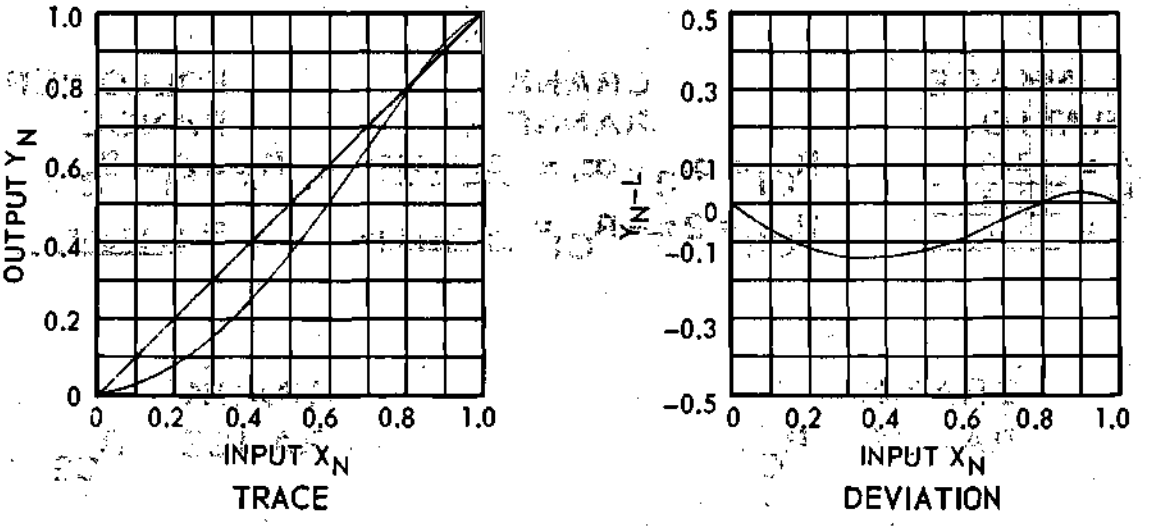
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 1.838317	$R_F = \beta_1 - \beta_2$
B = 2.5		= 1.508710
C = 1.5	$R_{C2} = 2\pi - R_{C1} =$ 4.444868	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.020497	-0.079503	0.022747	-0.077253
0.100374	-0.099626	0.077890	-0.122110
0.267873	-0.032127	0.156799	-0.143201
0.503977	0.103977	0.256654	-0.143346
0.715971	0.215971	0.375594	-0.124406
0.853880	0.253880	0.510567	-0.089433
0.932584	0.232584	0.656134	-0.043866
0.974698	0.174698	0.802984	0.002984
0.994515	0.094515	0.933131	0.033131
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

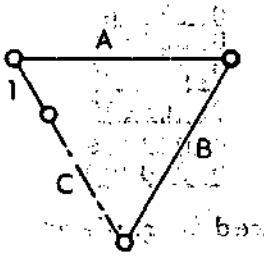


CRANK RANGE RC1



CRANK RANGE RC2

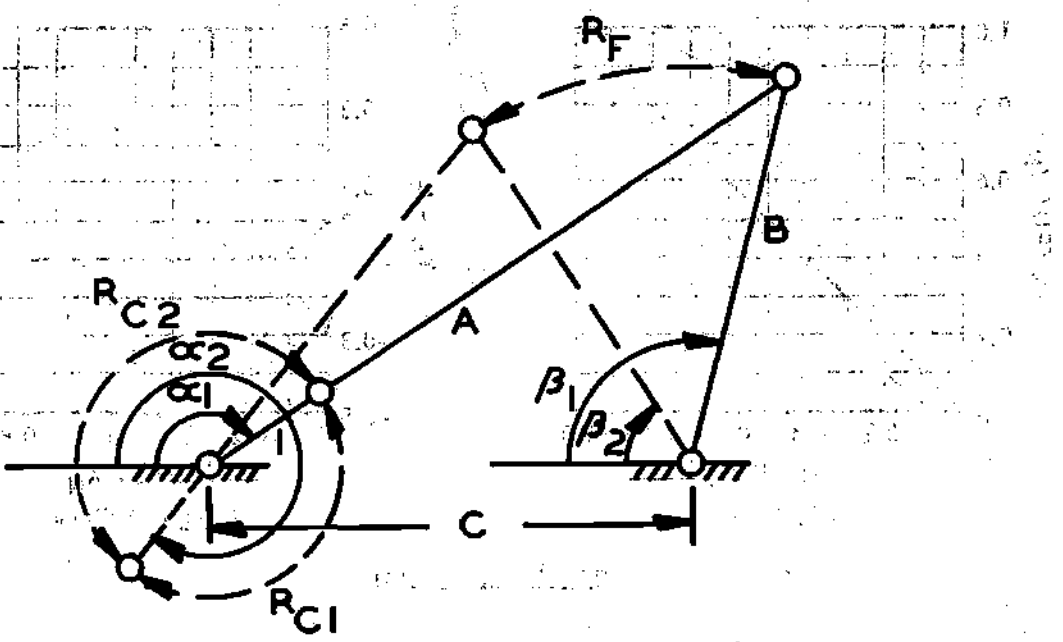
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.5

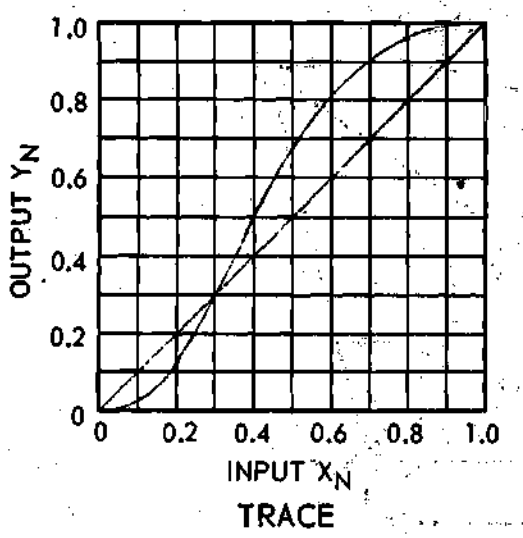
C = 1.5



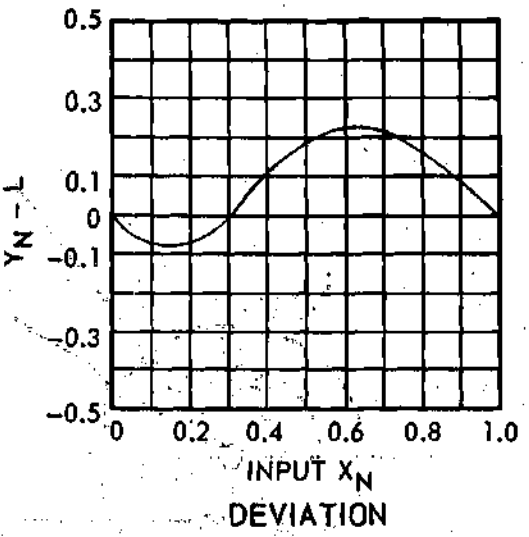
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.345990	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.937196	= 1.128653
C = 2.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027899	-0.072101	0.018632	-0.081368
0.124587	-0.075413	0.069369	-0.130631
0.294793	-0.005207	0.148136	-0.151864
0.502429	0.102429	0.252652	-0.147348
0.688867	0.188867	0.379809	-0.120191
0.824736	0.224736	0.524112	-0.075888
0.912889	0.212889	0.676785	-0.023215
0.965299	0.165299	0.824482	0.024482
0.992096	0.092096	0.945502	0.045502
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

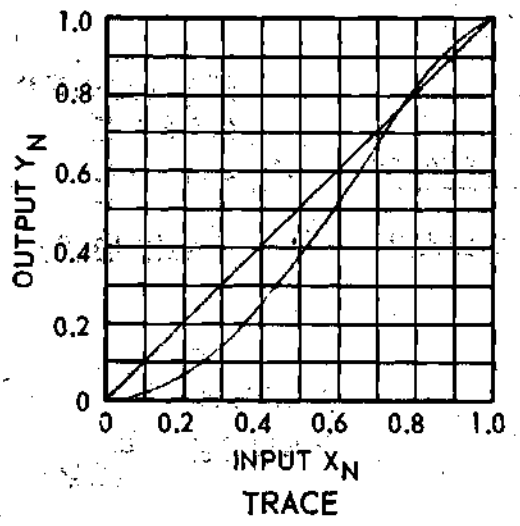


TRACE

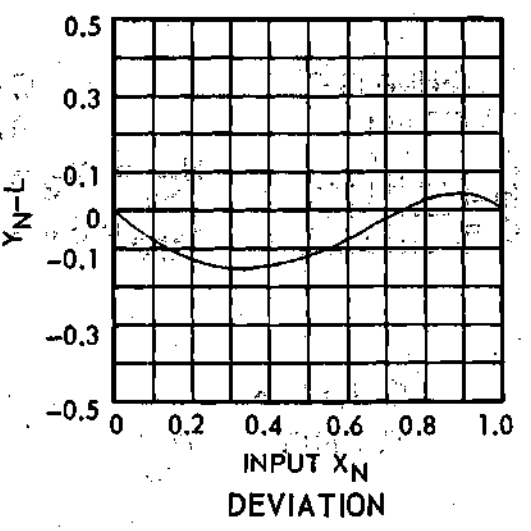


DEVIATION

CRANK RANGE RC1



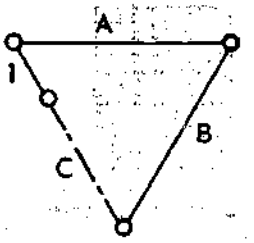
TRACE



DEVIATION

CRANK RANGE RC2

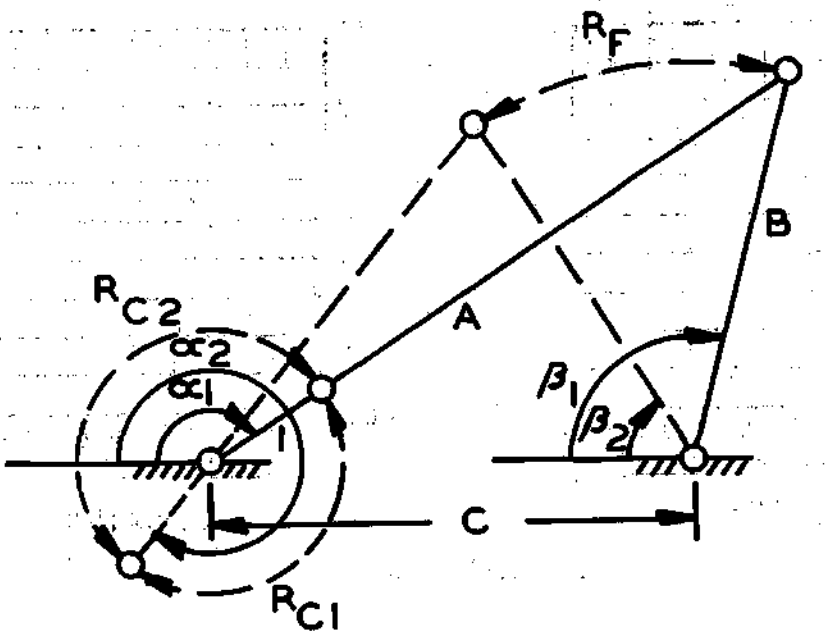
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.5

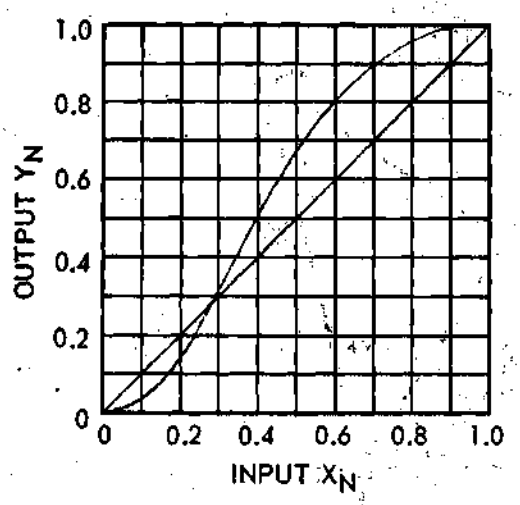
C = 2.0



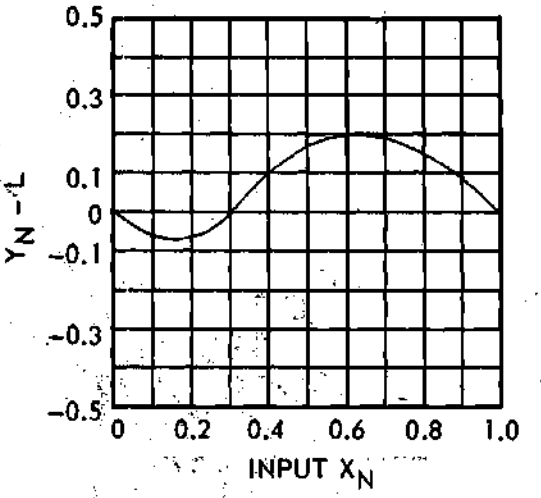
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.670888	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.612297	= 0.941410
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032600	-0.067400	0.016817	-0.083183
0.137613	-0.062387	0.065808	-0.134192
0.306571	0.006571	0.145848	-0.154152
0.500338	0.100338	0.255160	-0.144840
0.674288	0.174288	0.389275	-0.110725
0.807356	0.207356	0.540140	-0.059860
0.899595	0.199595	0.696061	-0.003939
0.958204	0.158204	0.841197	0.041197
0.990084	0.090084	0.953346	0.053346
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

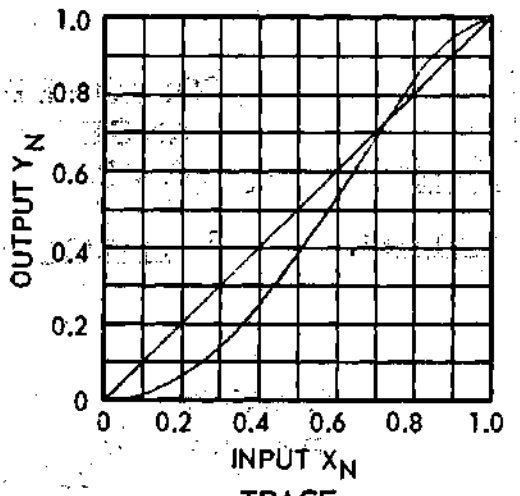


TRACE

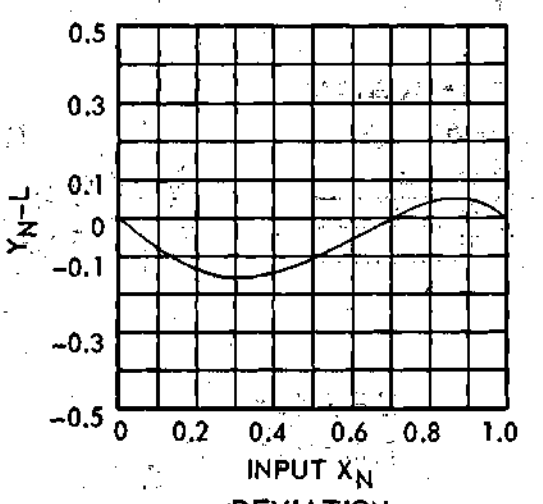


DEVIATION

CRANK RANGE RC1



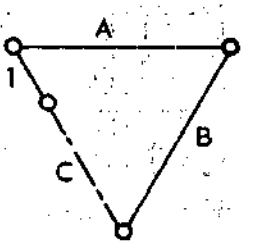
TRACE



DEVIATION

CRANK RANGE RC2

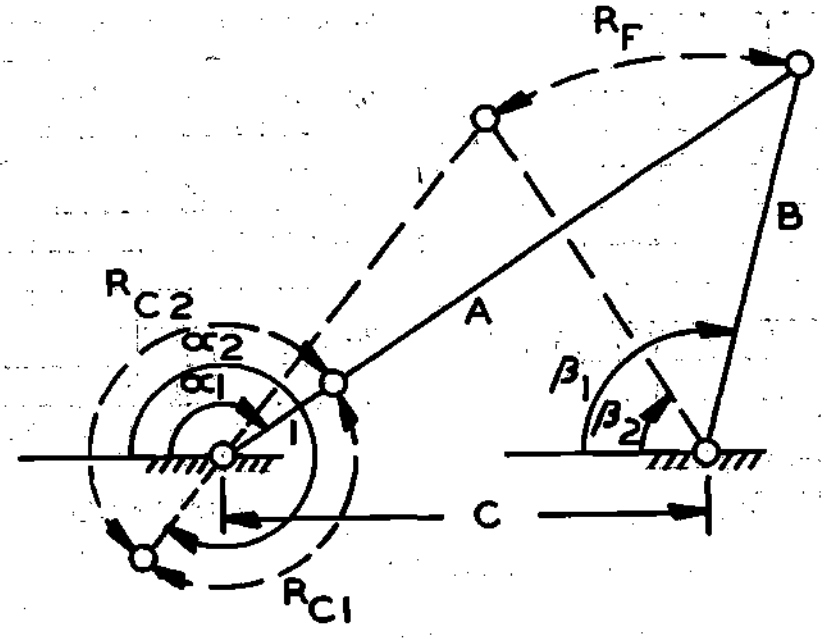
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.5

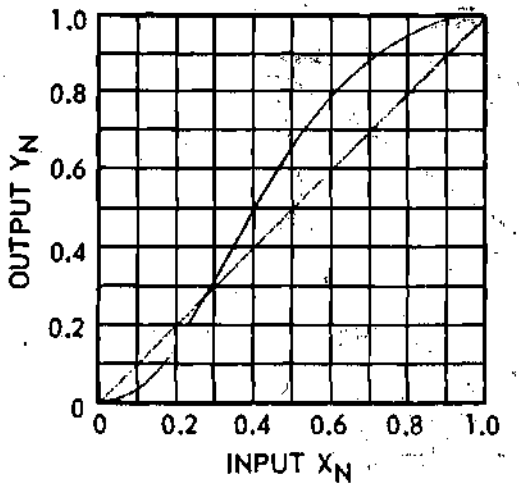
C = 2.5



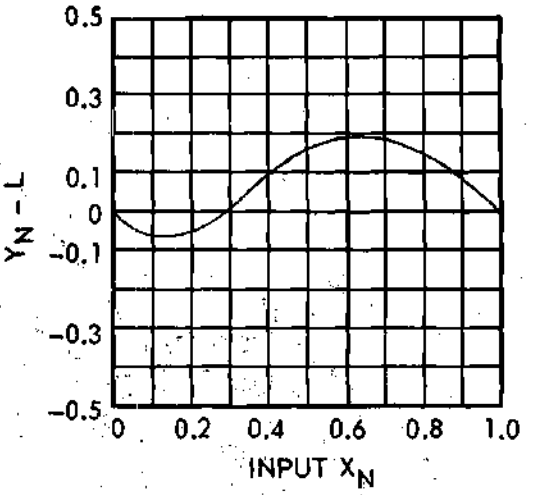
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.935021	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.348165	= 0.847124
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035970	-0.064030	0.016136	-0.083864
0.145729	-0.054271	0.065716	-0.134284
0.312039	0.012039	0.149826	-0.150174
0.495766	0.095766	0.266288	-0.133712
0.660895	0.160895	0.408044	-0.091956
0.791469	0.191469	0.563801	-0.036199
0.886659	0.186659	0.719442	0.019442
0.950753	0.150753	0.858313	0.058313
0.987803	0.087803	0.960111	0.060111
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

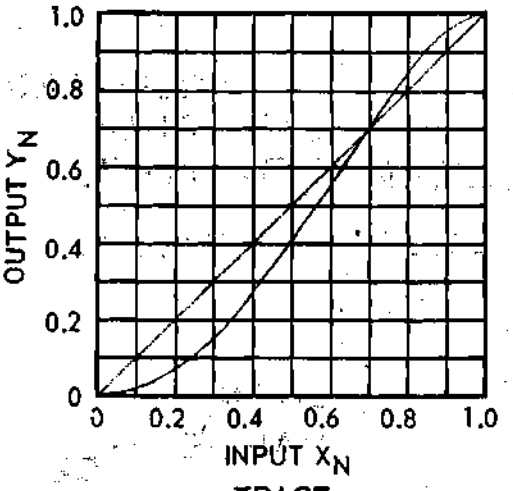


TRACE

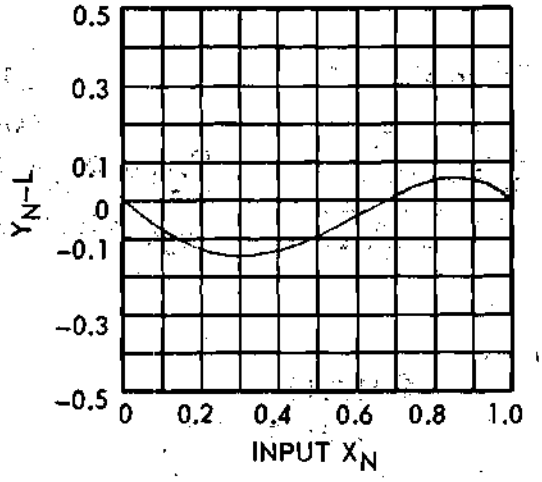


DEVIATION

CRANK RANGE RC1



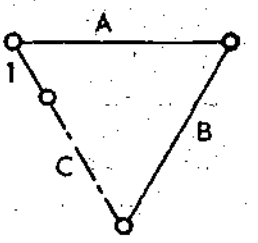
TRACE



DEVIATION

CRANK RANGE RC2

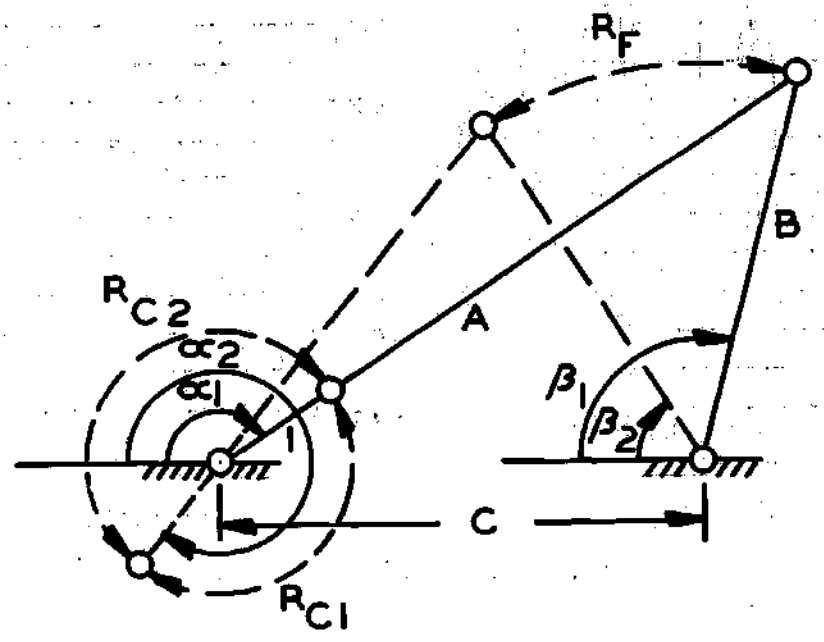
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.5

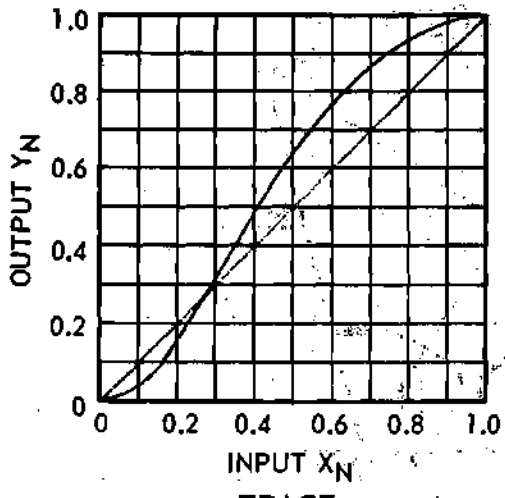
C = 3.0



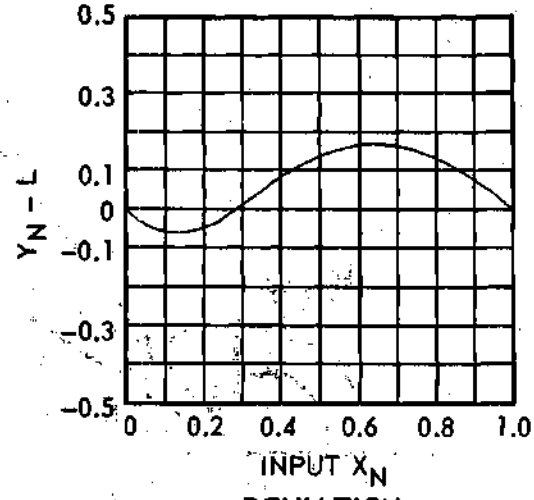
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.205061	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.078125	= 0.825338
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.038404	-0.061596	0.017077	-0.082923
0.150291	-0.049709	0.072507	-0.127493
0.311818	0.011818	0.168504	-0.131496
0.485270	0.085270	0.298600	-0.101400
0.641691	0.141691	0.449587	-0.050413
0.769500	0.169500	0.606516	0.006516
0.867918	0.167918	0.754960	0.054960
0.939107	0.139107	0.880497	0.080497
0.983913	0.083913	0.967616	0.067616
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

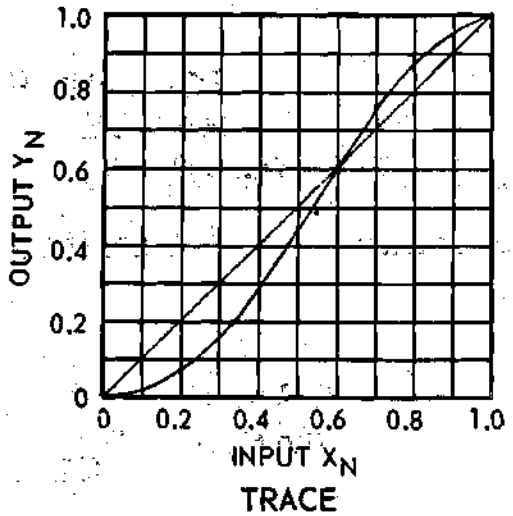


TRACE

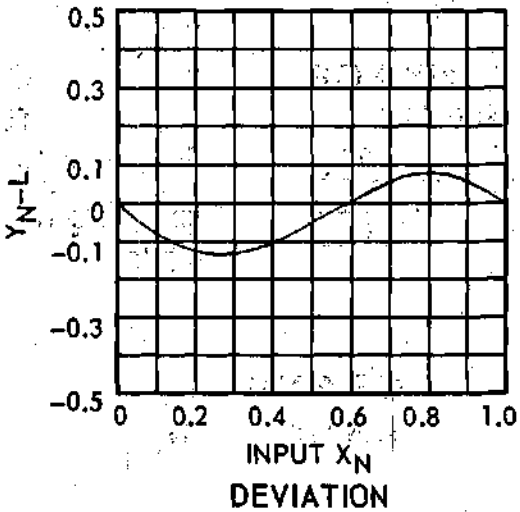


DEVIATION

CRANK RANGE RC1



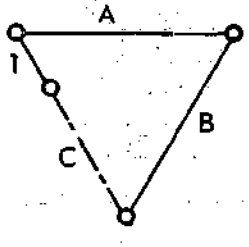
TRACE



DEVIATION

CRANK RANGE RC2

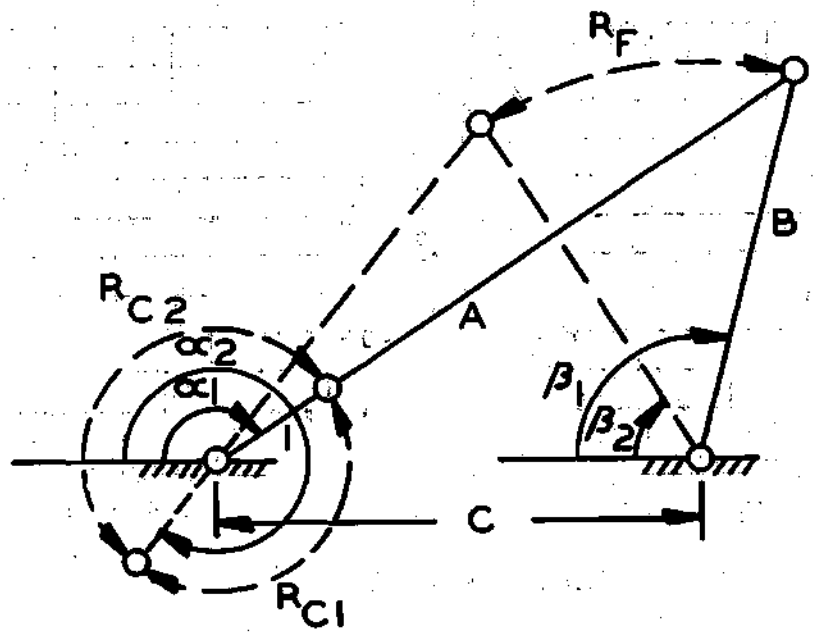
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 2.5

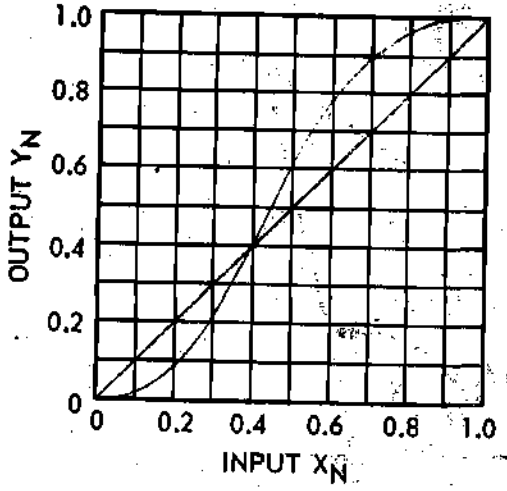
C = 3.5



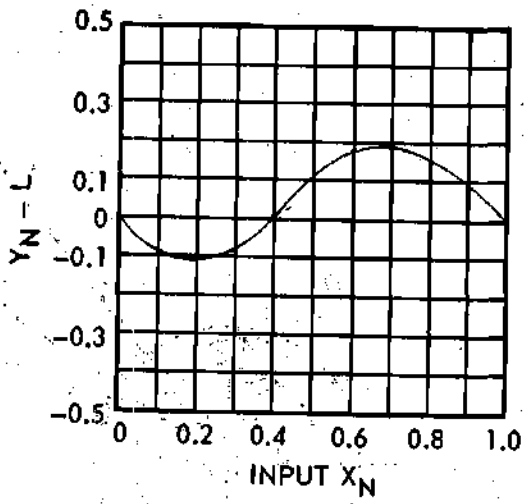
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.121129	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 4.162056	= 1.047762
C = 2.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.019851	-0.080149	0.022993	-0.077007
0.089183	-0.110817	0.079928	-0.120072
0.220449	-0.079551	0.162273	-0.137727
0.409435	0.009435	0.266968	-0.133032
0.616772	0.116772	0.391775	-0.108225
0.787480	0.187480	0.532696	-0.067304
0.899216	0.199216	0.682186	-0.017814
0.961997	0.161997	0.827358	0.027358
0.991787	0.091787	0.946433	0.046433
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

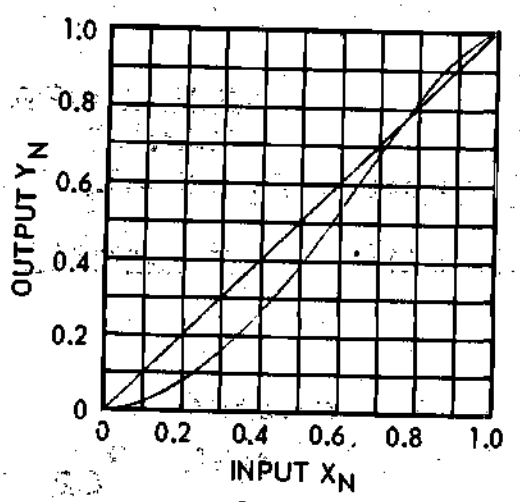


TRACE

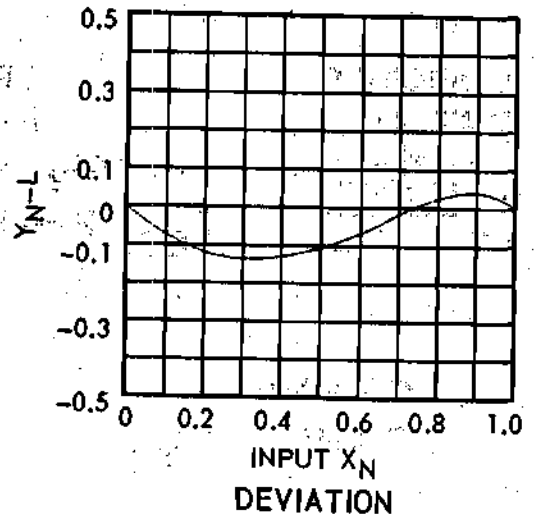


DEVIATION

CRANK RANGE RC1



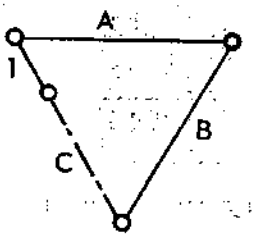
TRACE



DEVIATION

CRANK RANGE RC2

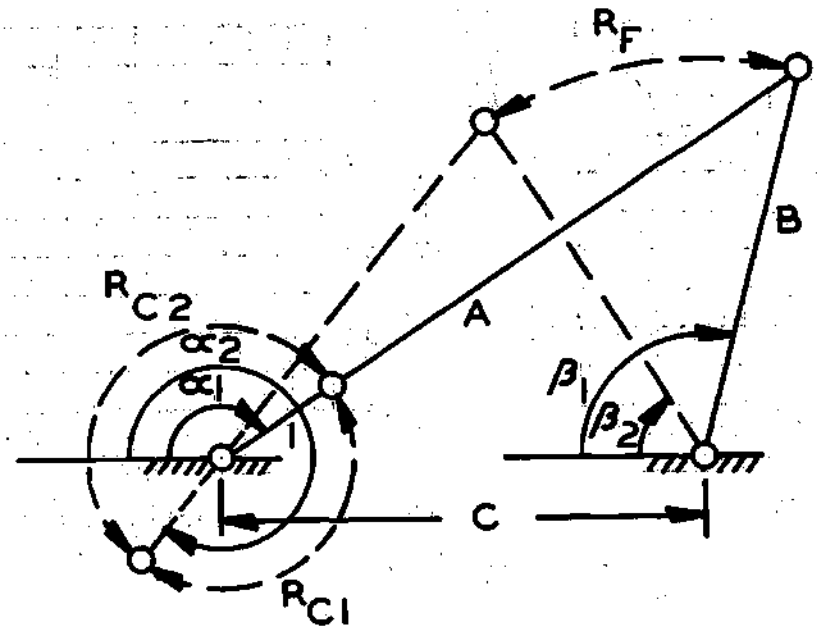
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.0

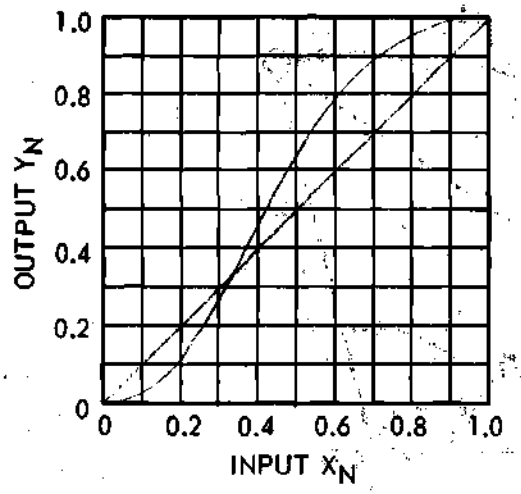
C = 2.0



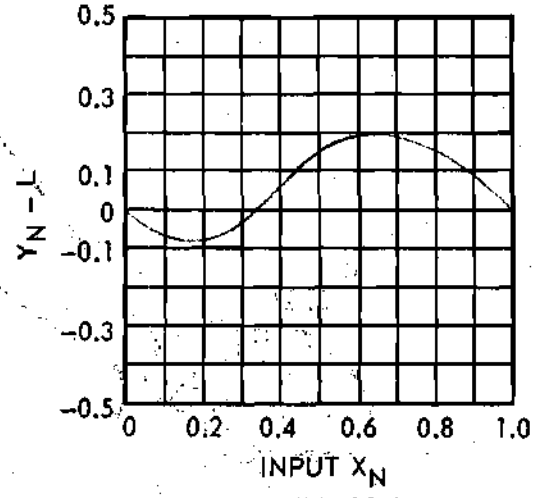
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.501041	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.782144	= 0.847124
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027072	-0.072928	0.018619	-0.081381
0.116249	-0.083751	0.069951	-0.130049
0.268716	-0.031284	0.150358	-0.149642
0.460353	0.060353	0.257713	-0.142287
0.646987	0.146987	0.388727	-0.111273
0.794841	0.194841	0.537047	-0.062953
0.896216	0.196216	0.692108	-0.007892
0.958264	0.158264	0.838145	0.038145
0.990441	0.090441	0.952134	0.052134
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

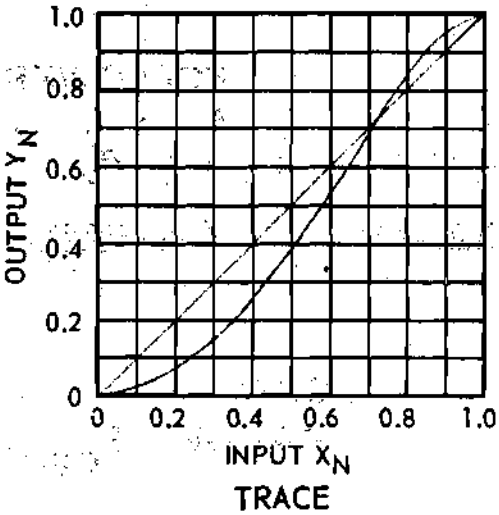


TRACE

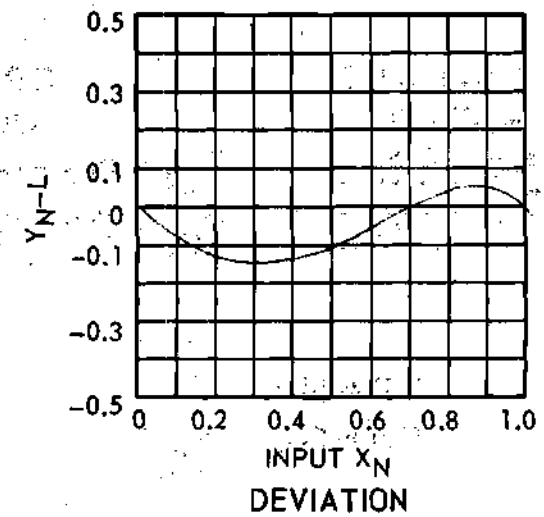


DEVIATION

CRANK RANGE NO1



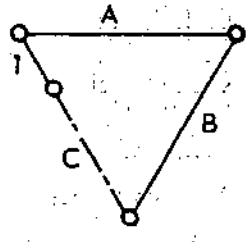
TRACE



DEVIATION

CRANK RANGE NO2

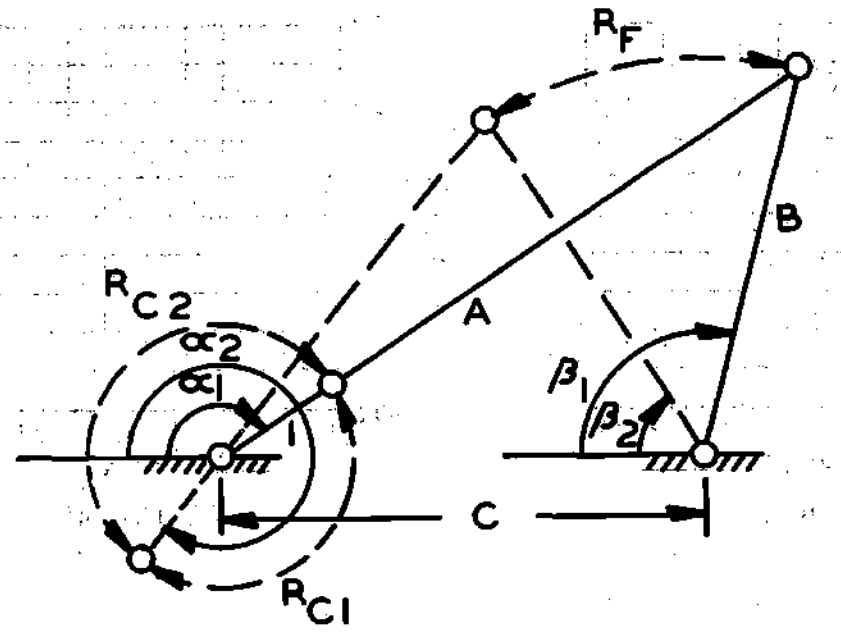
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.0

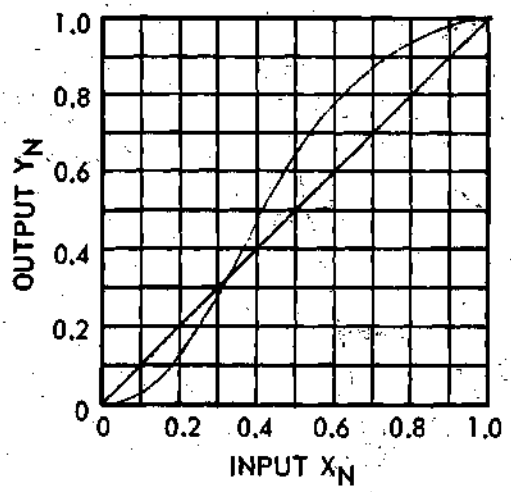
C = 2.5



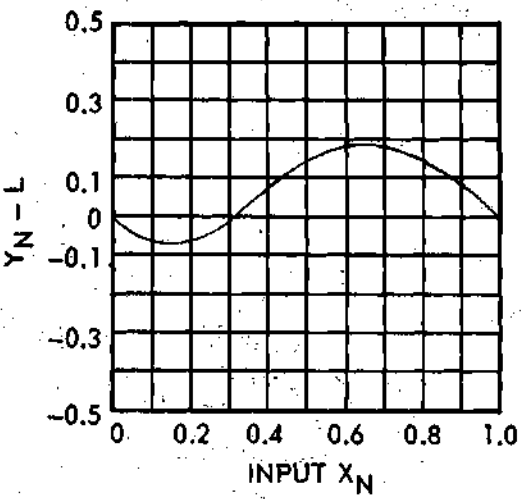
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.771446	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.511739	= 0.740293
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031878	-0.068122	0.016727	-0.083273
0.131656	-0.068344	0.065874	-0.134126
0.290473	-0.009527	0.146798	-0.153202
0.476543	0.076543	0.258041	-0.141959
0.650873	0.150873	0.395045	-0.104955
0.789939	0.189939	0.548930	-0.051070
0.889251	0.189251	0.706440	0.006440
0.953534	0.153534	0.850050	0.050050
0.988910	0.088910	0.957295	0.057295
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

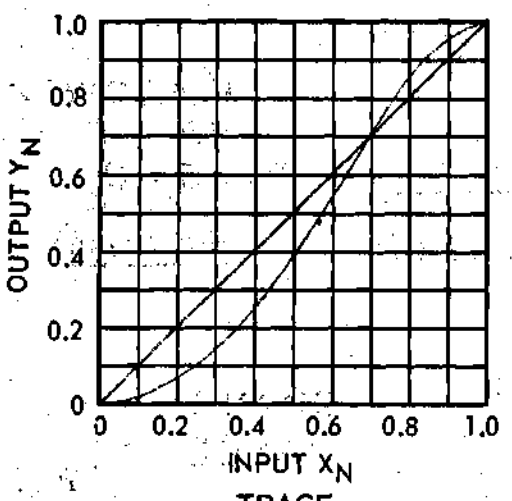


TRACE

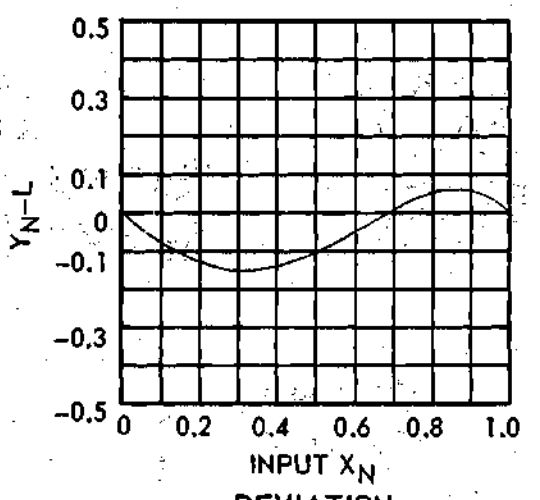


DEVIATION

CRANK RANGE RC1



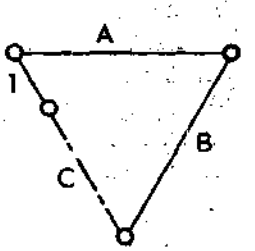
TRACE



DEVIATION

CRANK RANGE RC2

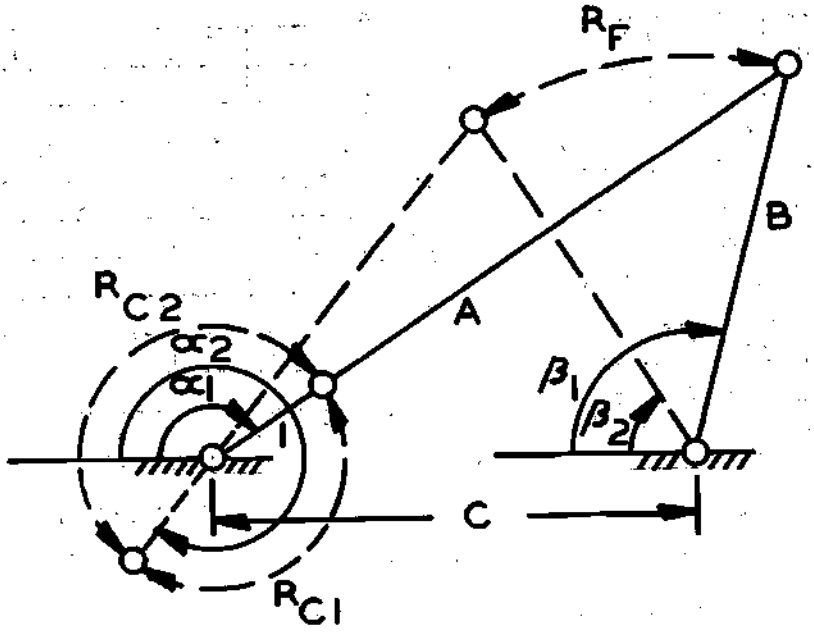
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.0

C = 3.0



LINKAGE RATIO

A = 2.5
B = 3.0
C = 3.5

CRANK RANGE

$R_{C1} = \alpha_2 - \alpha_1 =$ 3.007935
$R_{C2} = 2\pi - R_{C1} =$ 3.275250

FOLLOWER RANGE

$R_F = \beta_1 - \beta_2$
$=$ 0.687909

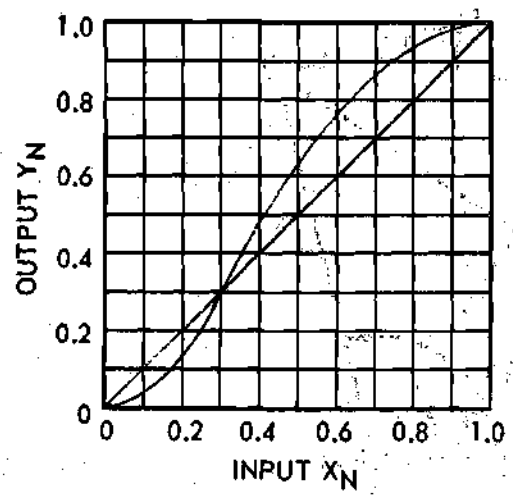
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.035381	-0.064619
0.141365	-0.058635
0.301254	0.001254
0.480588	0.080588
0.645971	0.145971
0.779984	0.179984
0.879468	0.179468
0.947298	0.147298
0.868741	0.086874
1.000000	0.000000

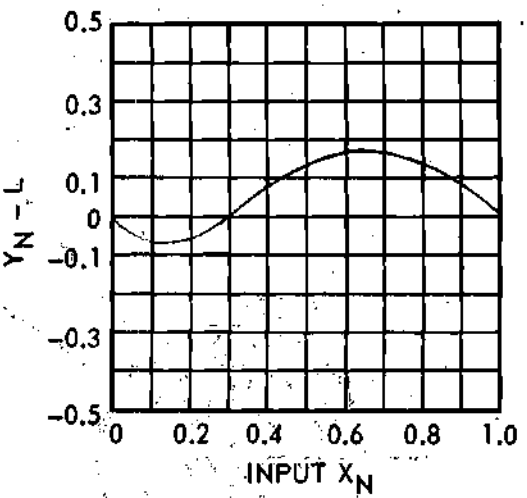
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.015995	-0.084005
0.065486	-0.134514
0.150100	-0.149900
0.268093	-0.131907
0.412294	-0.087706
0.570490	-0.029510
0.727163	0.027163
0.864553	0.064553
0.962688	0.062688
1.000000	0.000000

All angles measured in radians.

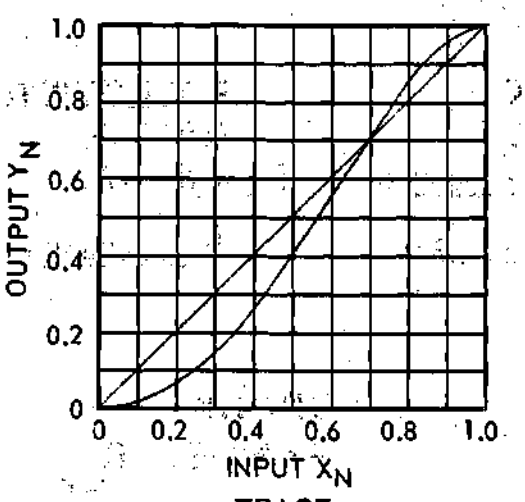


TRACE

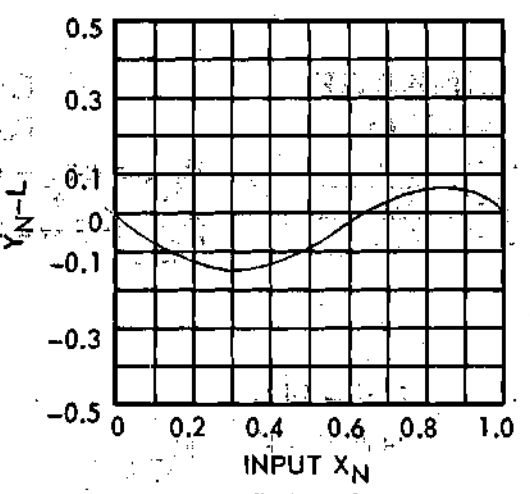


DEVIATION

CRANK RANGE RC1



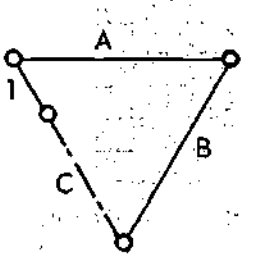
TRACE



DEVIATION

CRANK RANGE RC2

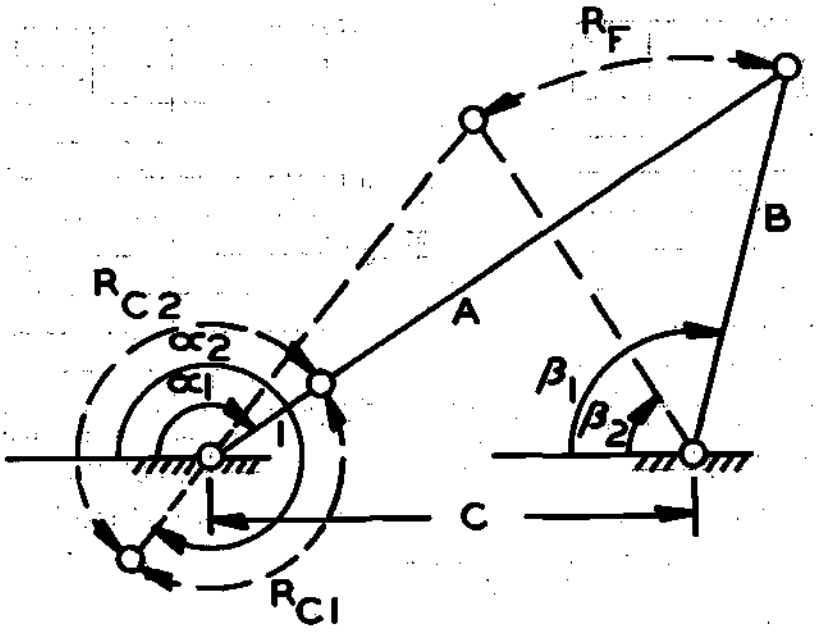
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.0

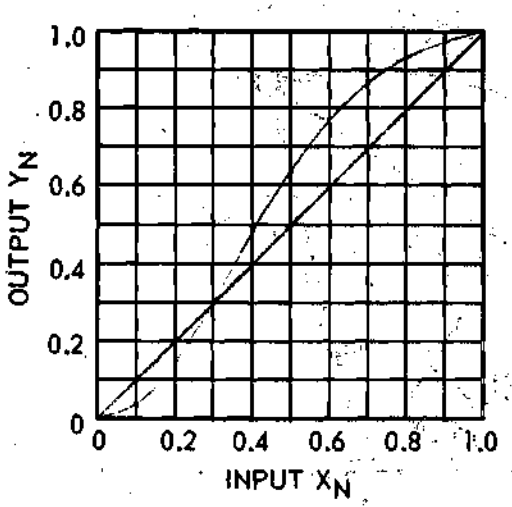
C = 3.5



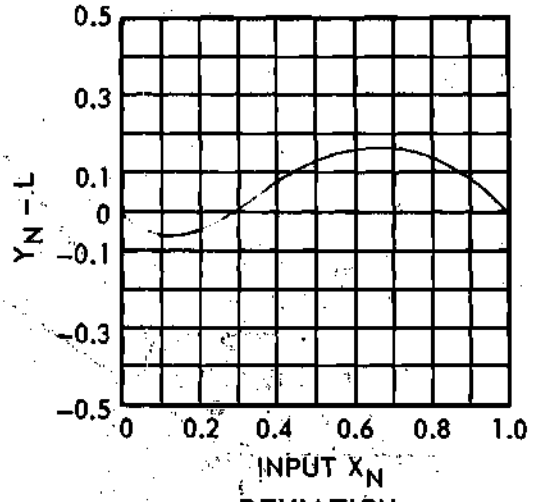
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.263700	$R_F = \beta_1 - \beta_2$
B = 3.0		= 0.686555
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.019485	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037936	-0.062064	0.016859	-0.083141
0.147021	-0.052979	0.071994	-0.128006
0.304233	0.004233	0.168414	-0.131586
0.474947	0.074947	0.300165	-0.099835
0.631484	0.131484	0.453550	-0.046450
0.761343	0.161343	0.612438	0.012438
0.862487	0.162487	0.761275	0.061275
0.936277	0.136277	0.885174	0.085174
0.983073	0.083073	0.969380	0.069380
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

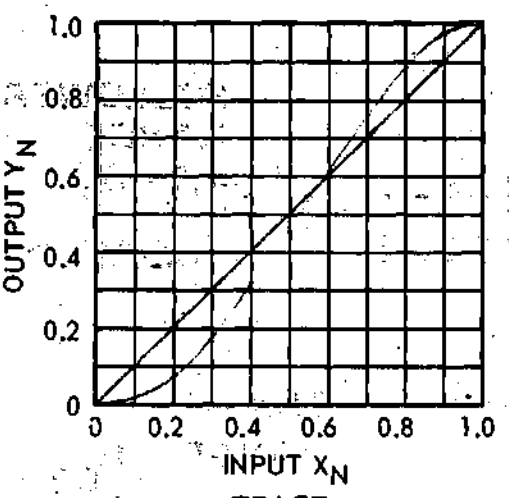


TRACE

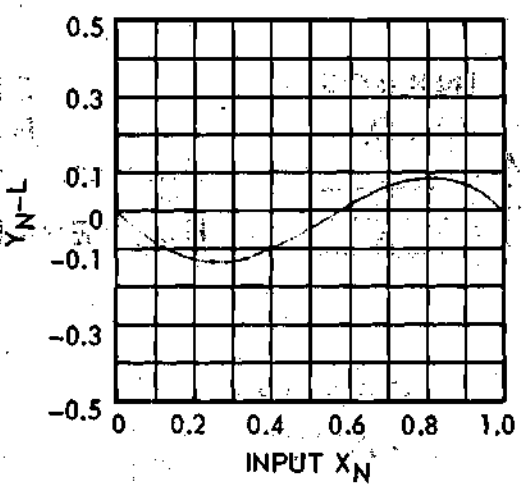


DEVIATION

CRANK RANGE RC1



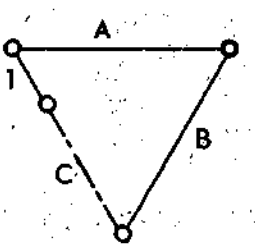
TRACE



DEVIATION

CRANK RANGE RC2

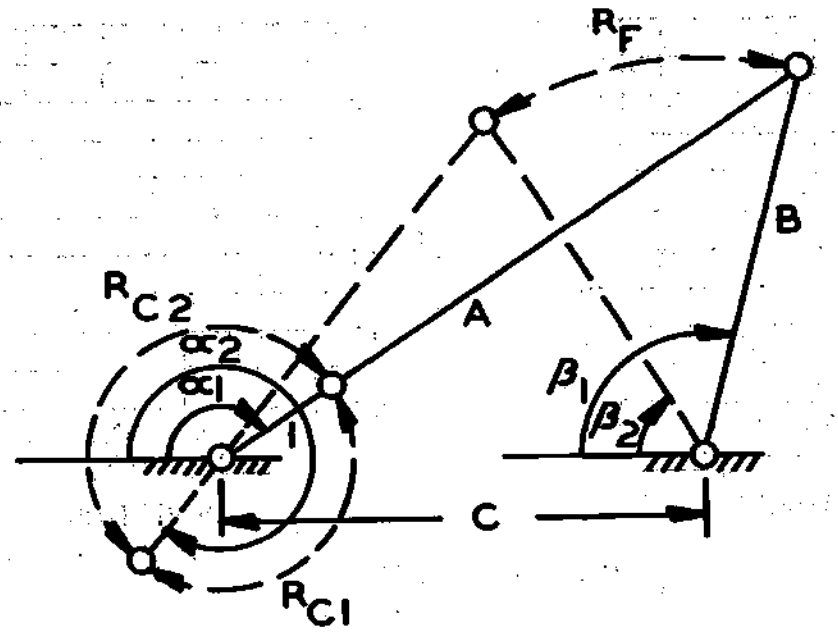
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.0

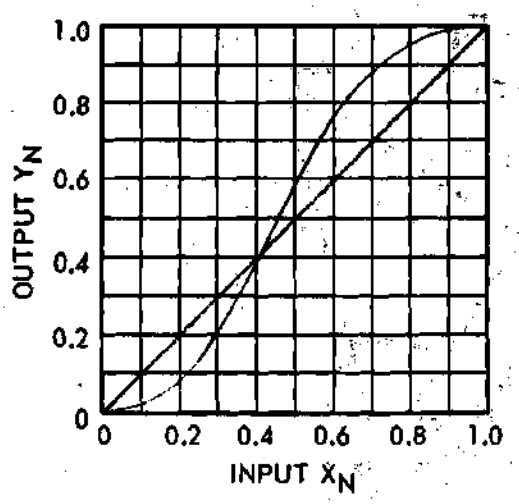
C = 4.0



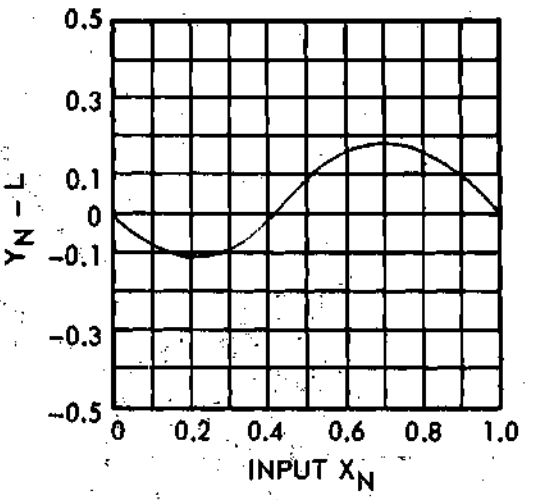
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.252787	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 4.030398	= 0.825338
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.020329	-0.079671	0.022832	-0.077168
0.088759	-0.111241	0.080074	-0.119926
0.213250	-0.086750	0.163469	-0.136531
0.388854	-0.011146	0.269948	-0.130052
0.586506	0.086506	0.397156	-0.102844
0.760981	0.160981	0.540649	-0.059351
0.883644	0.183644	0.691833	-0.008167
0.955594	0.155594	0.836201	0.036201
0.990359	0.090359	0.950861	0.050861
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

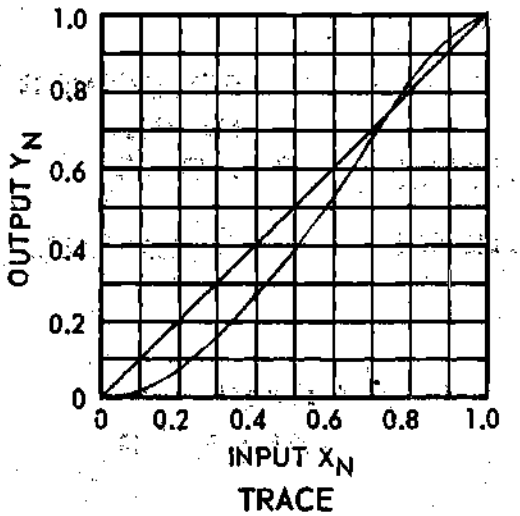


TRACE

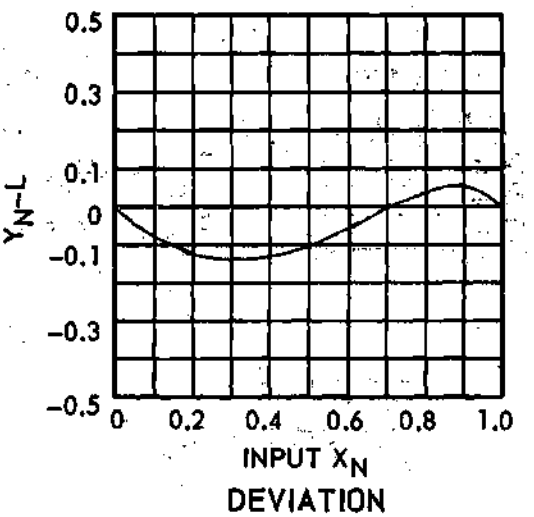


DEVIATION

CRANK RANGE RC1



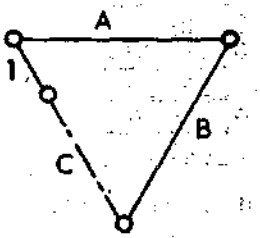
TRACE



DEVIATION

CRANK RANGE RC2

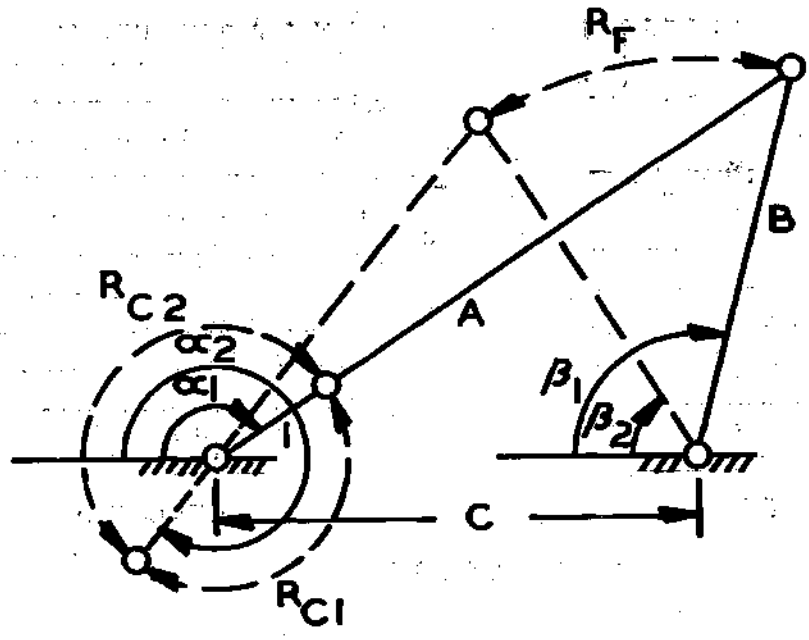
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.5

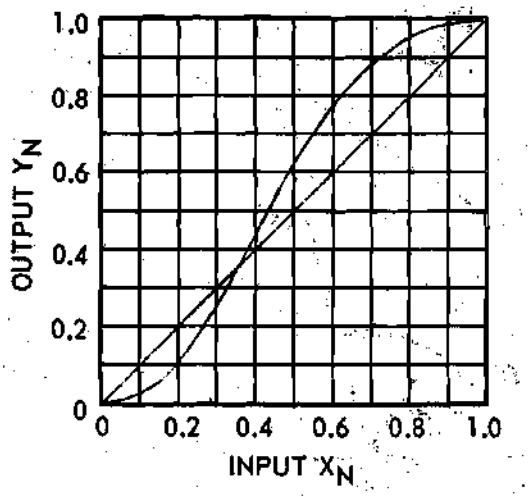
C = 2.5



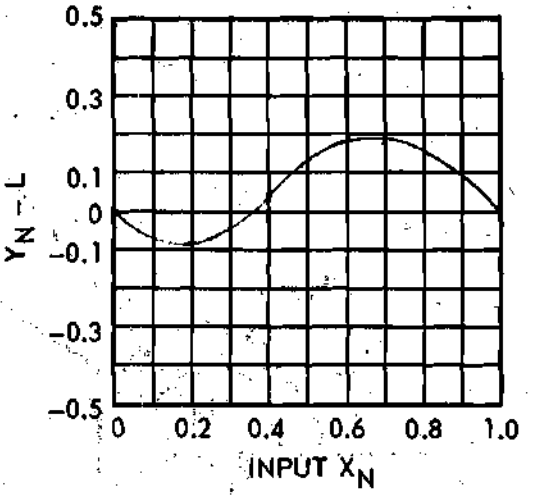
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.587341	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.695845	= 0.687909

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027122	-0.072878	0.018472	-0.081528
0.114261	-0.085739	0.069811	-0.130189
0.260422	-0.039578	0.150742	-0.149258
0.444483	0.044483	0.259321	-0.140679
0.628626	0.128626	0.392243	-0.107757
0.780147	0.180147	0.542701	-0.057299
0.887392	0.187392	0.699106	-0.000894
0.954368	0.154368	0.844384	0.044384
0.989497	0.089497	0.955041	0.055041
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

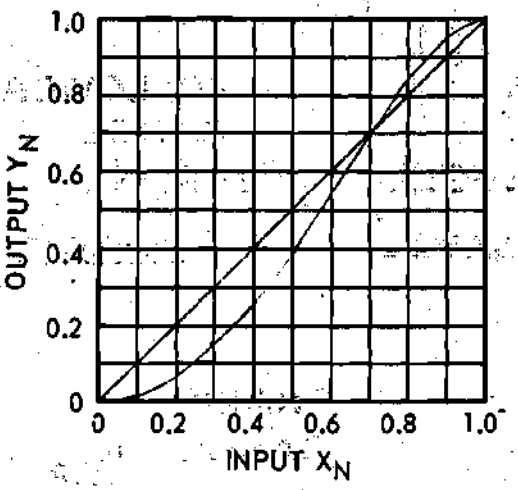


TRACE

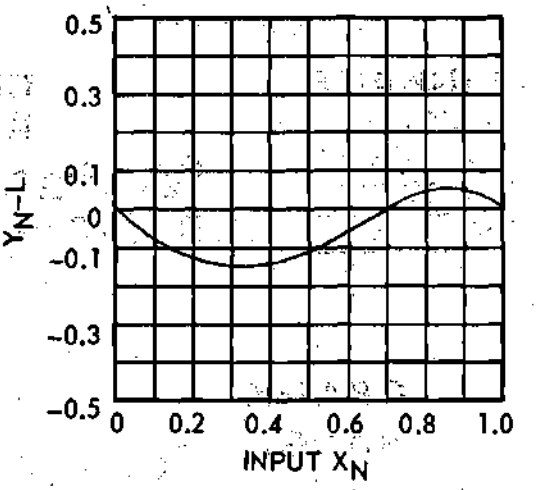


DEVIATION

CRANK RANGE RC1



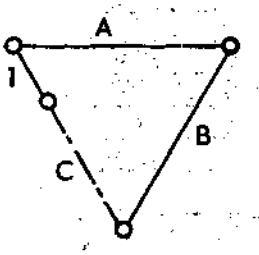
TRACE



DEVIATION

CRANK RANGE RC2

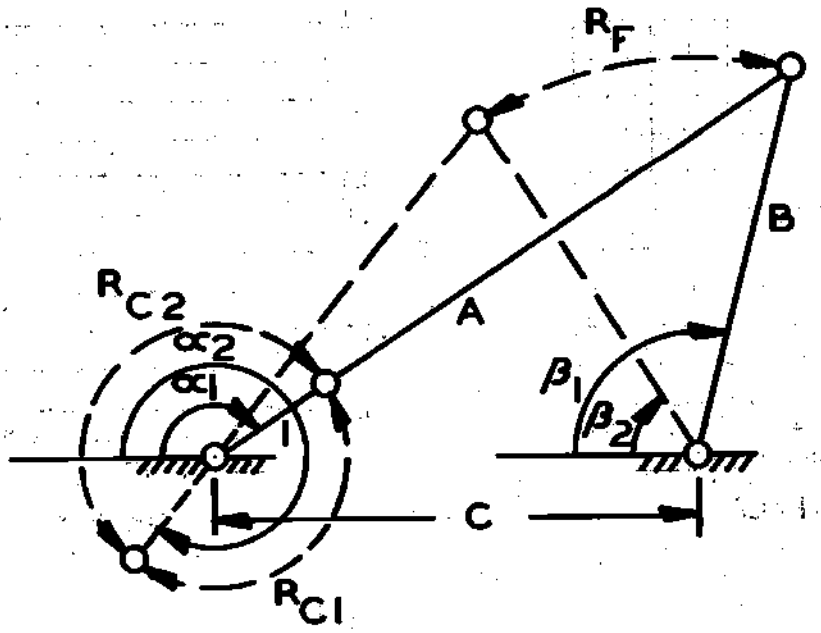
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.5

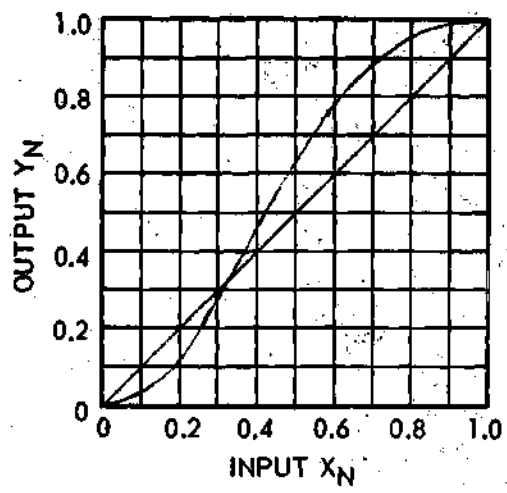
C = 3.0



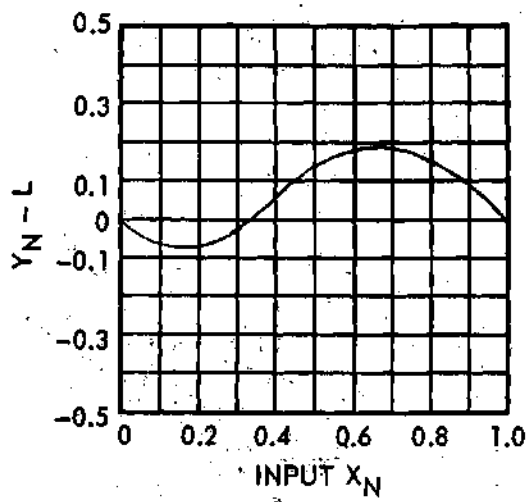
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.833954	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.449231	= 0.615277
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031776	-0.068224	0.016585	-0.083415
0.129543	-0.070457	0.065606	-0.134394
0.283662	-0.016338	0.146790	-0.153210
0.465300	0.065300	0.258959	-0.141041
0.638773	0.138773	0.397584	-0.102416
0.780313	0.180313	0.553298	-0.046702
0.883263	0.183263	0.711853	0.011853
0.950743	0.150743	0.854701	0.054701
0.988191	0.088191	0.959325	0.059325
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

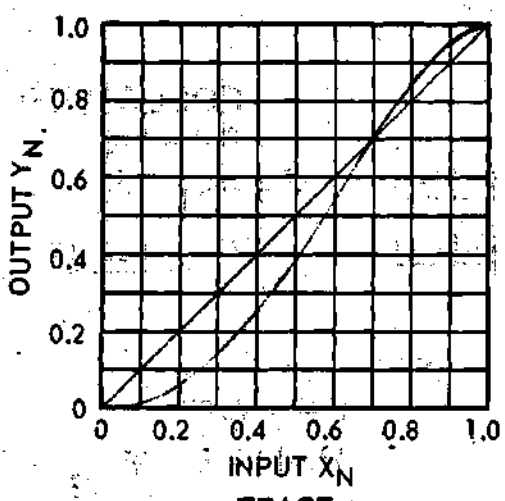


TRACE

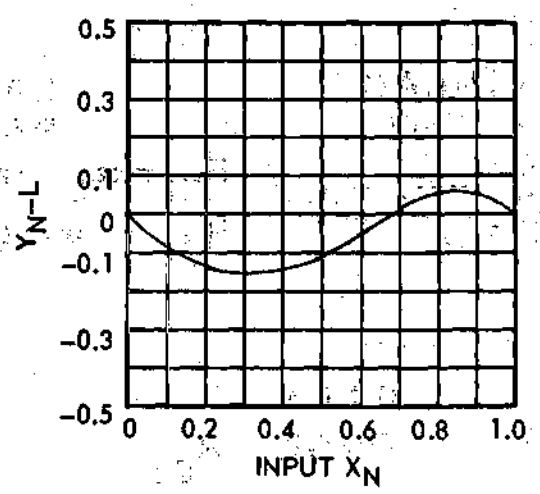


DEVIATION

CRANK RANGE RC1



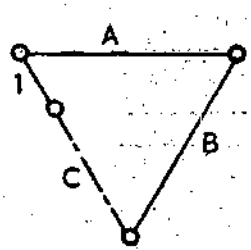
TRACE



DEVIATION

CRANK RANGE RC2

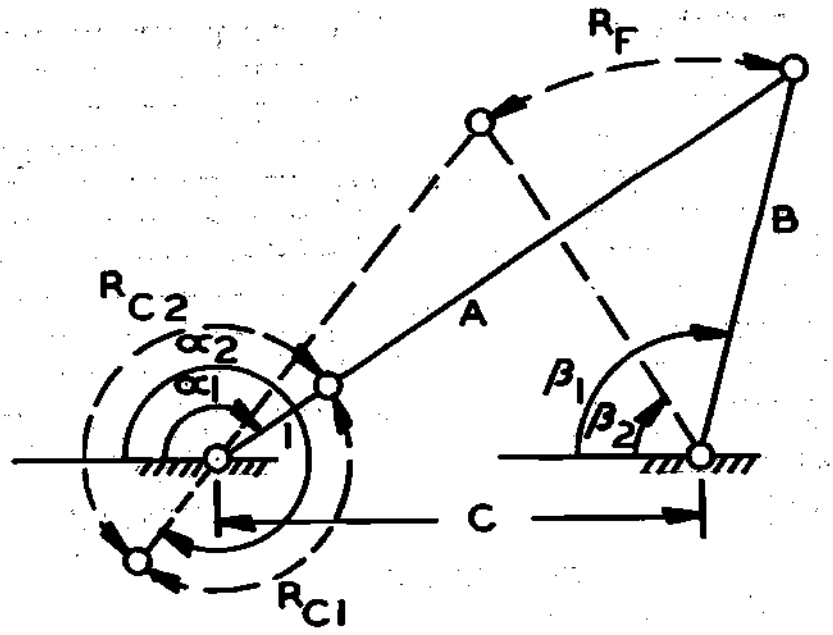
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.5

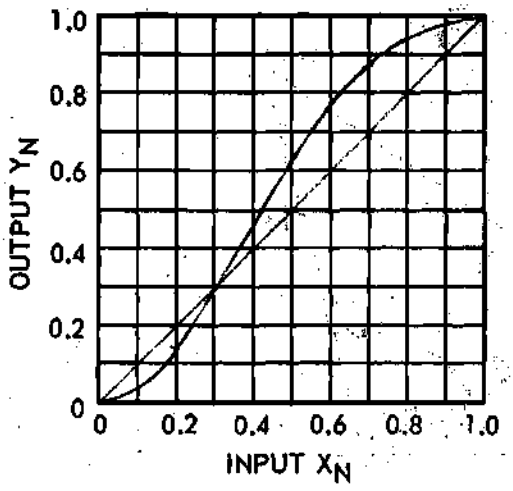
C = 3.5



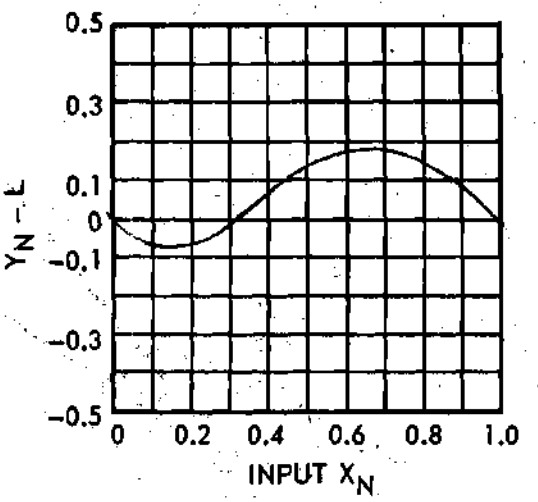
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.056946	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.226239	= 0.582300

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035234	-0.064766	0.015841	-0.084159
0.139473	-0.060527	0.065106	-0.134894
0.295908	-0.004092	0.149830	-0.150170
0.472430	0.072430	0.268641	-0.131359
0.637440	0.137440	0.414366	-0.085634
0.773112	0.173112	0.574186	-0.025814
0.875020	0.175020	0.731621	0.031621
0.945107	0.145107	0.868183	0.068183
0.986272	0.086272	0.964165	0.064165
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

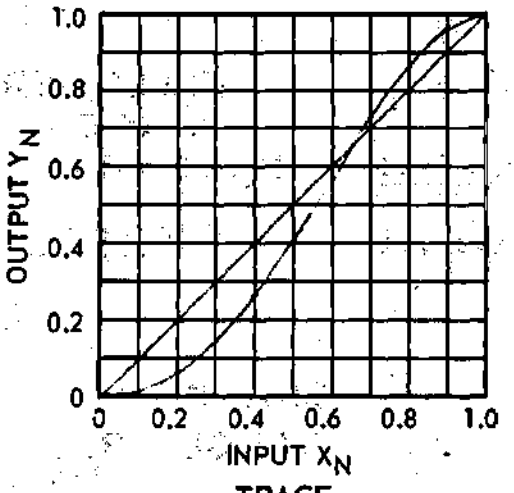


TRACE

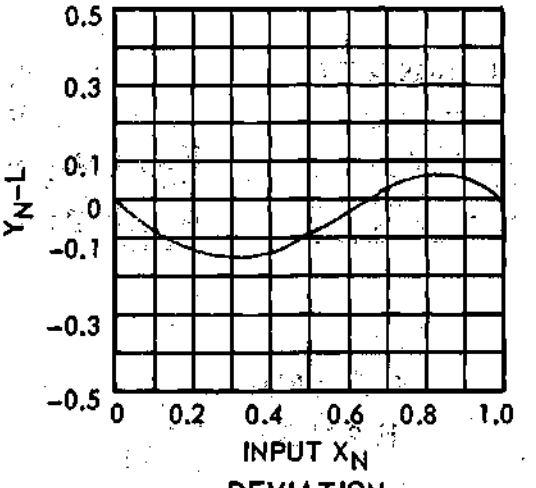


DEVIATION

CRANK RANGE RC1



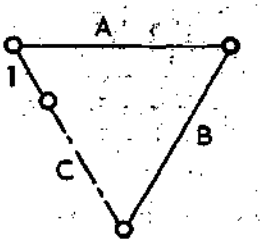
TRACE



DEVIATION

CRANK RANGE RC2

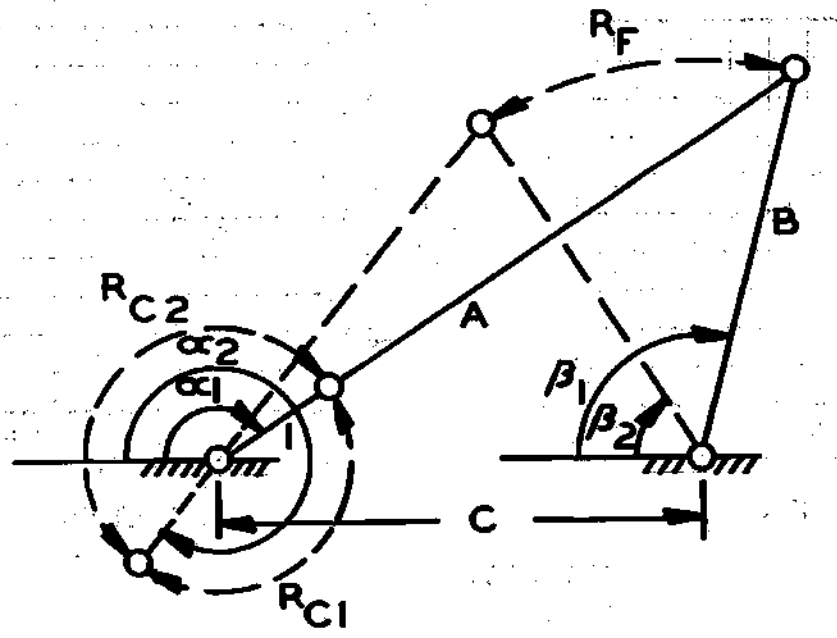
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.5

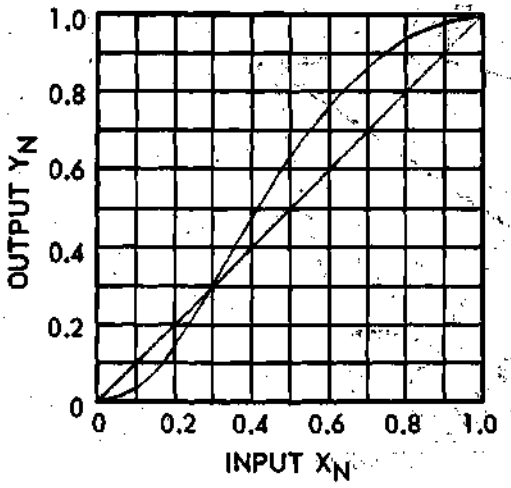
C = 4.0



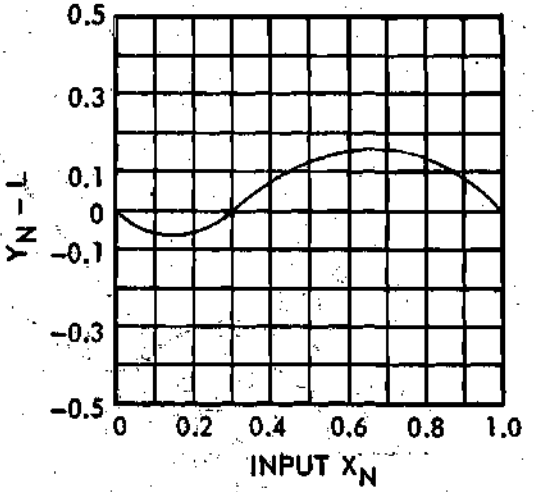
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.305544	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 2.977641	= 0.589916
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037791	-0.062209	0.016657	-0.083343
0.145420	-0.054580	0.071441	-0.128559
0.300076	0.000076	0.167972	-0.132028
0.468911	0.068911	0.300755	-0.099245
0.625237	0.125237	0.455793	-0.044207
0.756180	0.156180	0.616090	0.016090
0.858960	0.158960	0.765267	0.065267
0.934398	0.134398	0.888132	0.088132
0.982503	0.082503	0.970481	0.070481
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

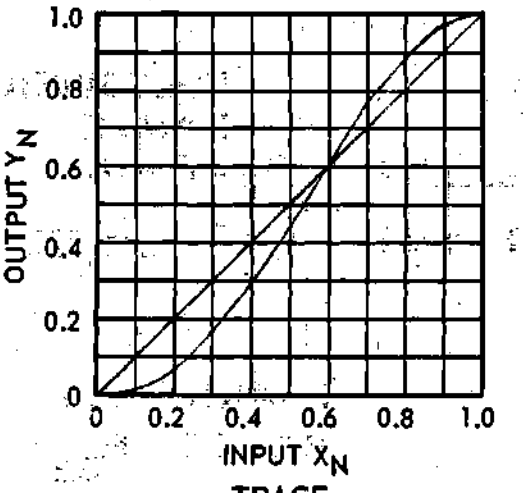


TRACE

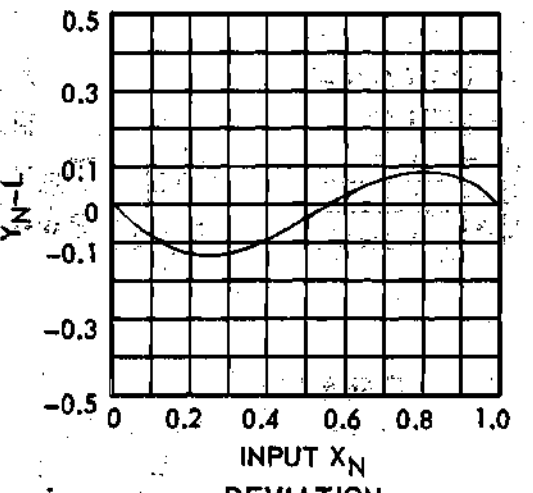


DEVIATION

CRANK RANGE RC1



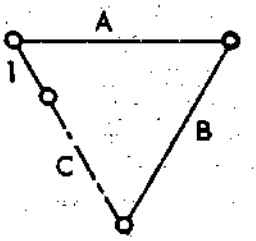
TRACE



DEVIATION

CRANK RANGE RC2

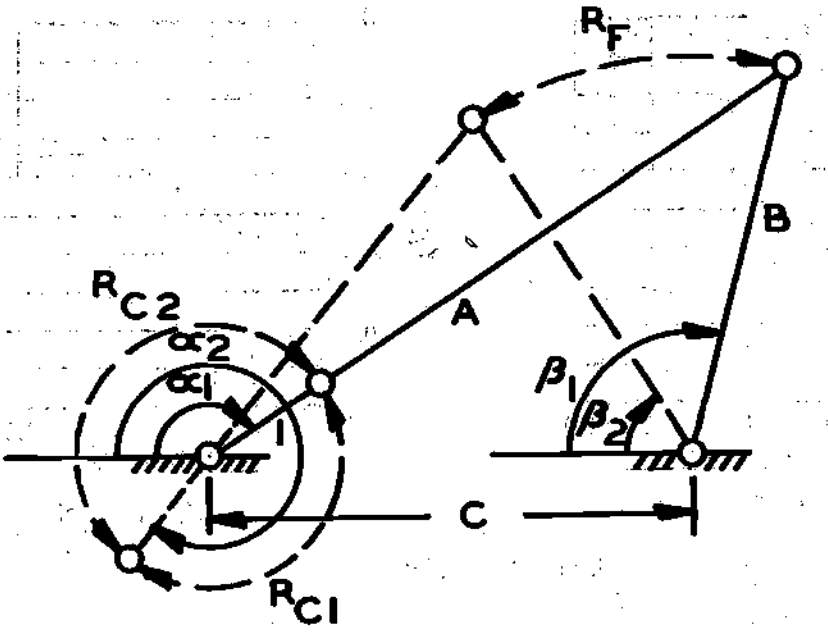
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 3.5

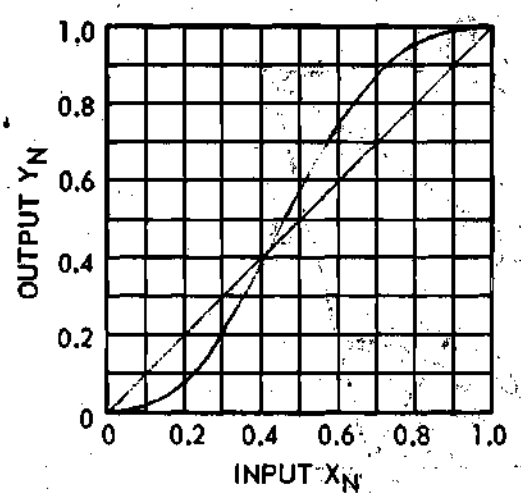
C = 4.5



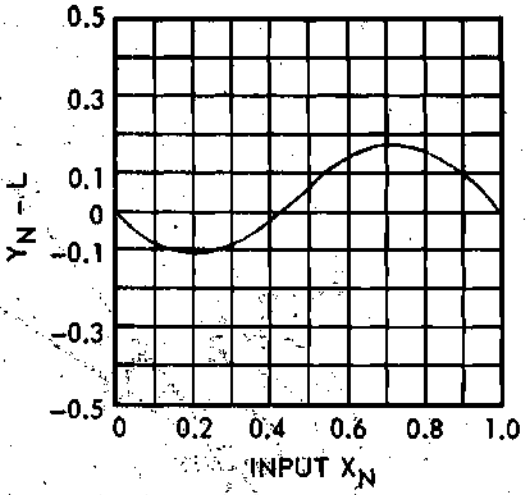
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1$ = 2.332930	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1}$ = 3.950255	= 0.686555
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.020783	-0.079217	0.022633	-0.077367
0.089322	-0.110678	0.079853	-0.120147
0.211233	-0.088767	0.163657	-0.136343
0.380715	-0.019285	0.271025	-0.128975
0.572569	0.072569	0.399573	-0.100427
0.747082	0.147082	0.544608	-0.055392
0.874661	0.174661	0.696880	-0.003120
0.951689	0.151689	0.840884	0.040884
0.989462	0.089462	0.953155	0.053155
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

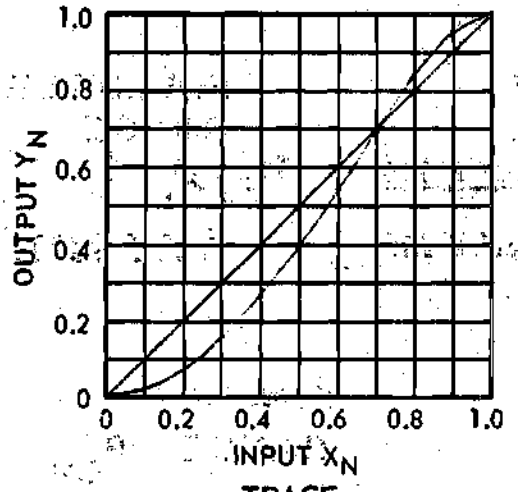


TRACE

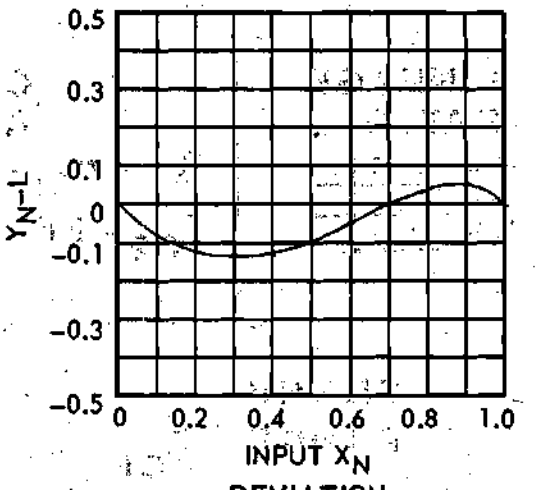


DEVIATION

CRANK RANGE RC1



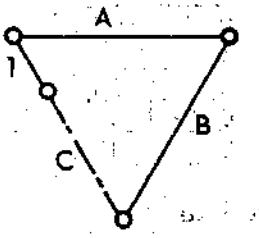
TRACE



DEVIATION

CRANK RANGE RC2

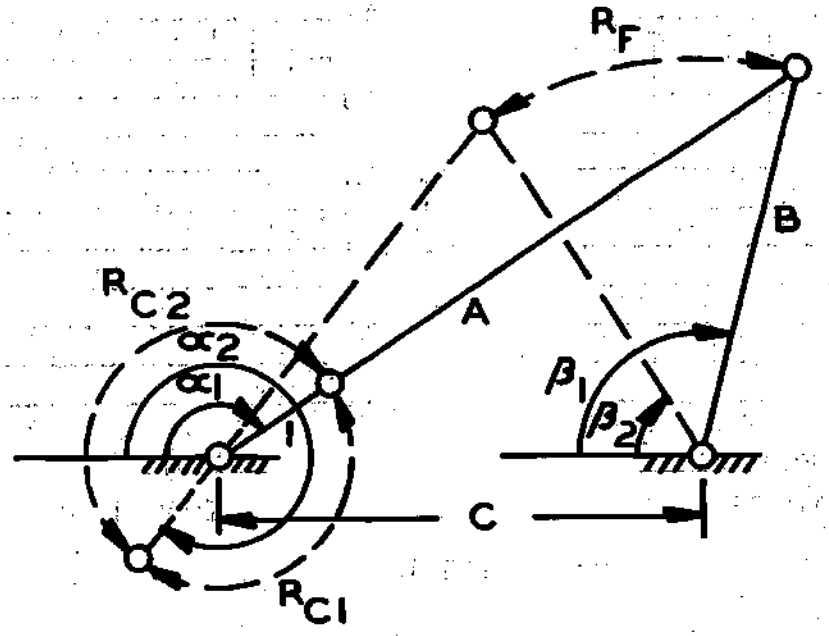
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 4.0

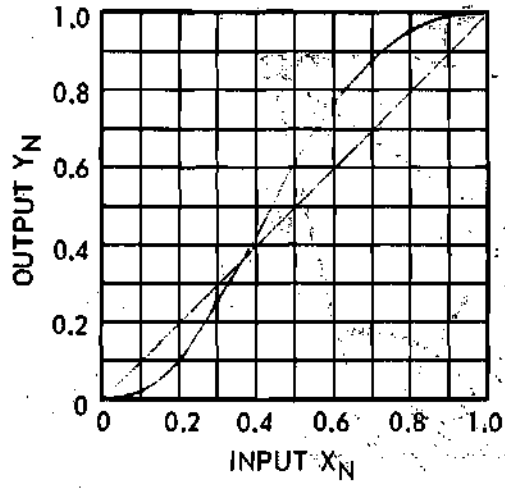
C = 3.0



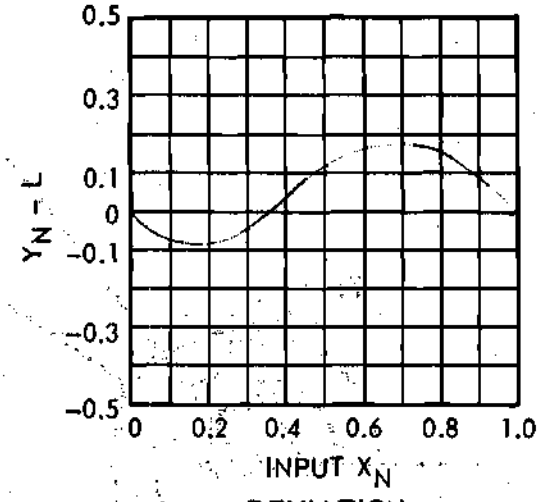
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.643940	$R_F = \beta_1 - \beta_2$
B = 4.0		
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.639245	= 0.582300

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027307	-0.072693	0.018316	-0.081684
0.113687	-0.086313	0.069514	-0.130486
0.256708	-0.043292	0.150605	-0.149395
0.436447	0.036447	0.259821	-0.140179
0.618491	0.118491	0.393889	-0.106111
0.771462	0.171462	0.545734	-0.054266
0.881919	0.181919	0.703080	0.003080
0.951874	0.151874	0.847986	0.047986
0.988880	0.088880	0.956701	0.056701
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

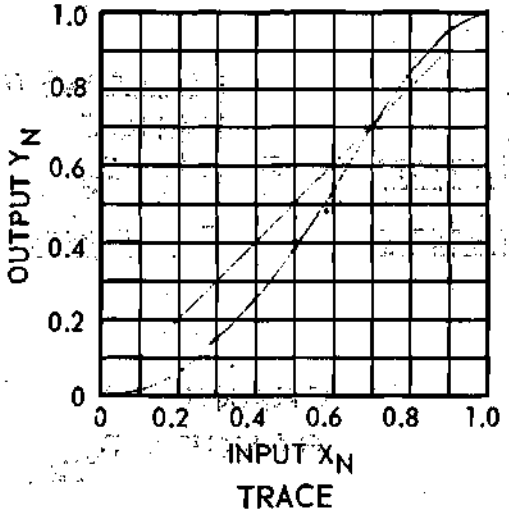


TRACE

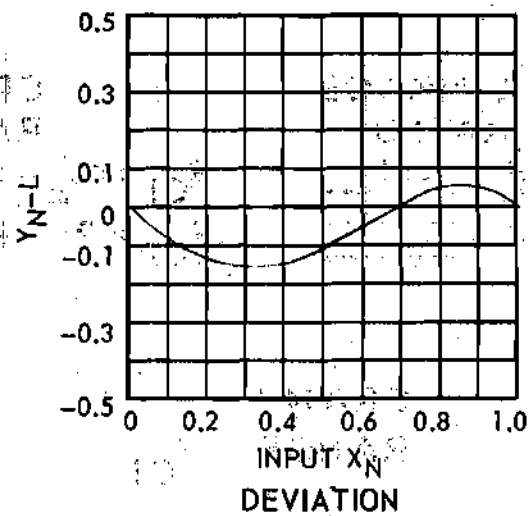


DEVIATION

CRANK RANGE R01



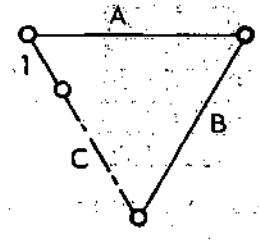
TRACE



DEVIATION

CRANK RANGE R02

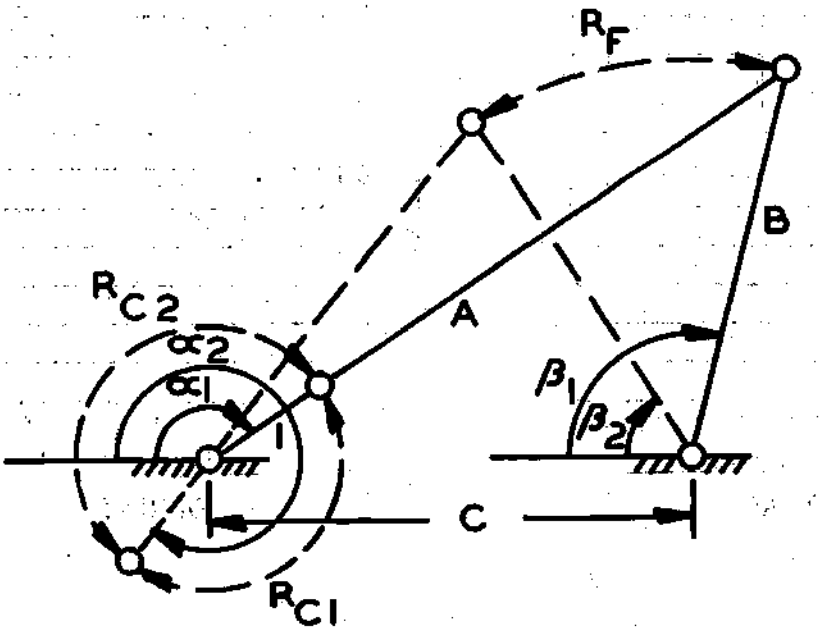
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 4.0

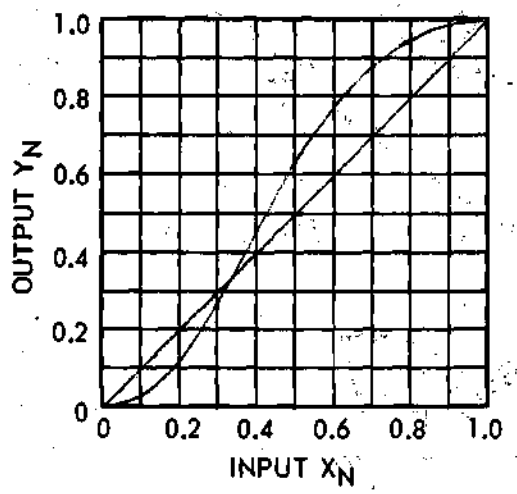
C = 3.5



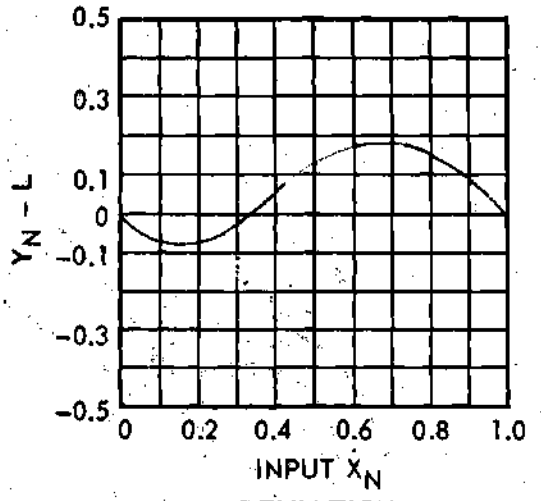
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.877392	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.405793	= 0.528400
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031833	-0.068167	0.016446	-0.083554
0.128638	-0.071362	0.065272	-0.134728
0.280090	-0.019910	0.146489	-0.153511
0.458892	0.058892	0.259165	-0.140835
0.631456	0.131456	0.398832	-0.101168
0.774227	0.174227	0.555809	-0.044191
0.879354	0.179354	0.715149	0.015149
0.948879	0.148879	0.857582	0.057582
0.987703	0.087703	0.960574	0.060574
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

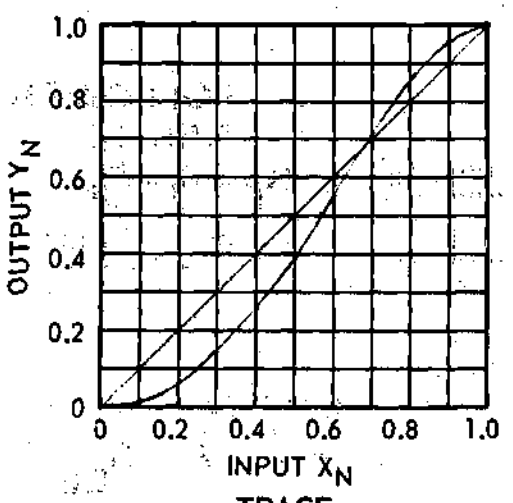


TRACE

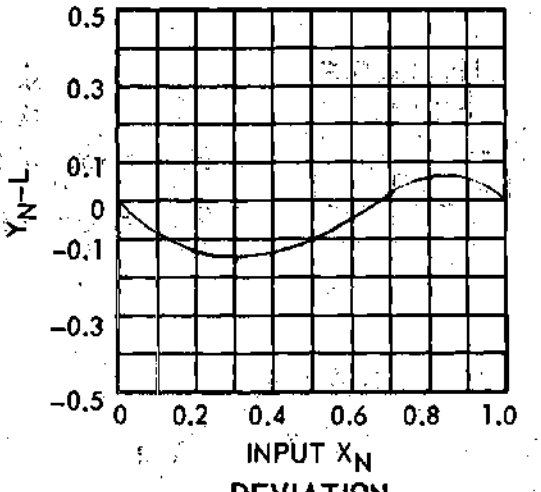


DEVIATION

CRANK RANGE RC1



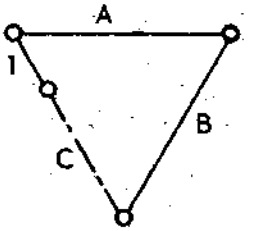
TRACE



DEVIATION

CRANK RANGE RC2

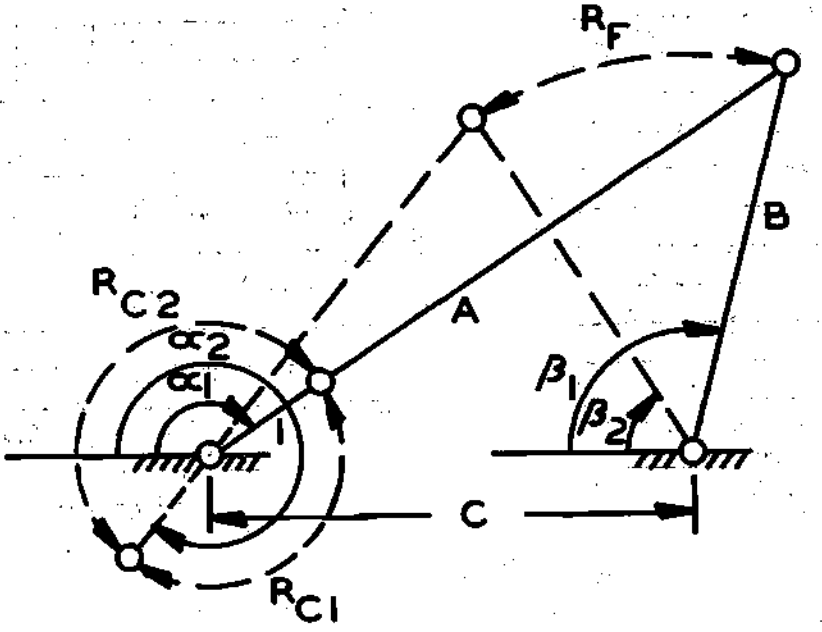
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 4.0

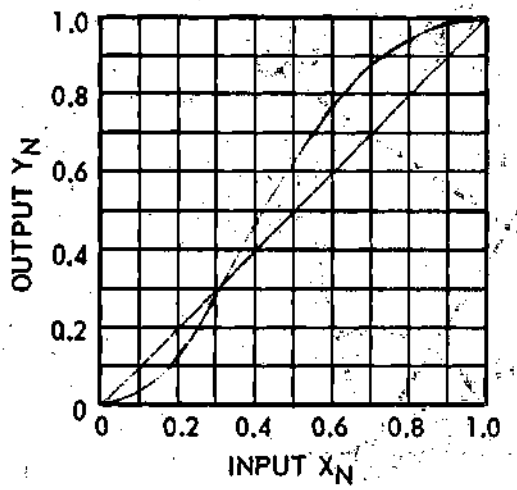
C = 4.0



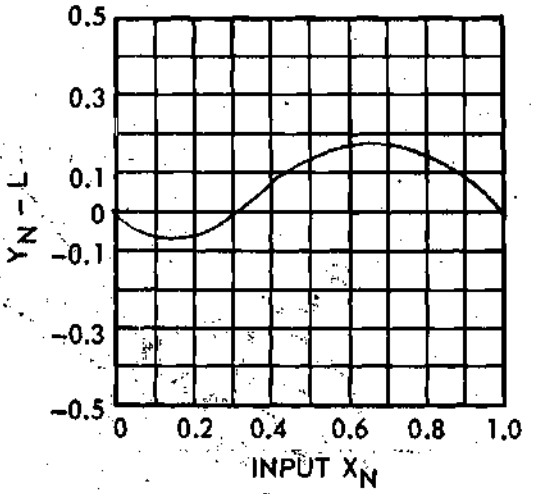
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.092620	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.190565	= 0.506173
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035234	-0.064766	0.015699	-0.084301
0.138529	-0.061471	0.064714	-0.135286
0.292829	-0.007171	0.149396	-0.150604
0.467417	0.067417	0.268690	-0.131310
0.631961	0.131961	0.415463	-0.084537
0.768552	0.168552	0.576471	-0.023528
0.871998	0.171998	0.734514	0.034514
0.943589	0.143589	0.870569	0.070569
0.985849	0.085849	0.965133	0.065133
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

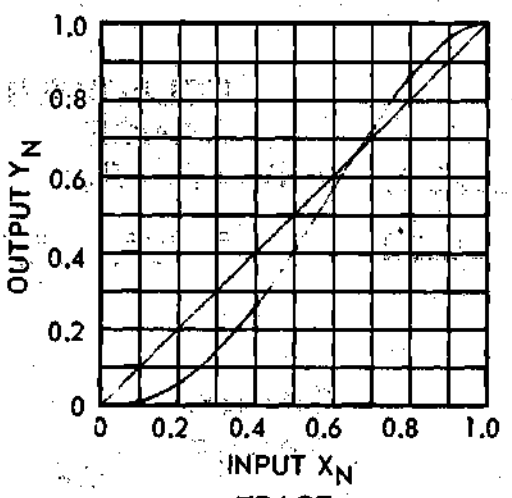


TRACE

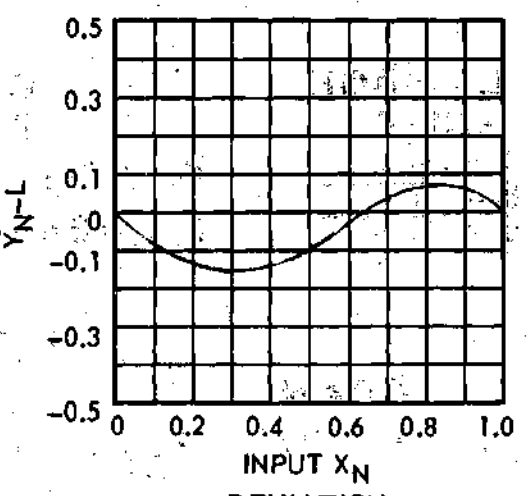


DEVIATION

CRANK RANGE RC1



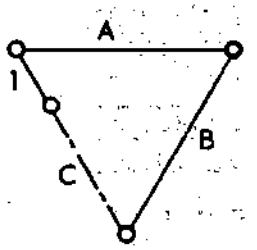
TRACE



DEVIATION

CRANK RANGE RC2

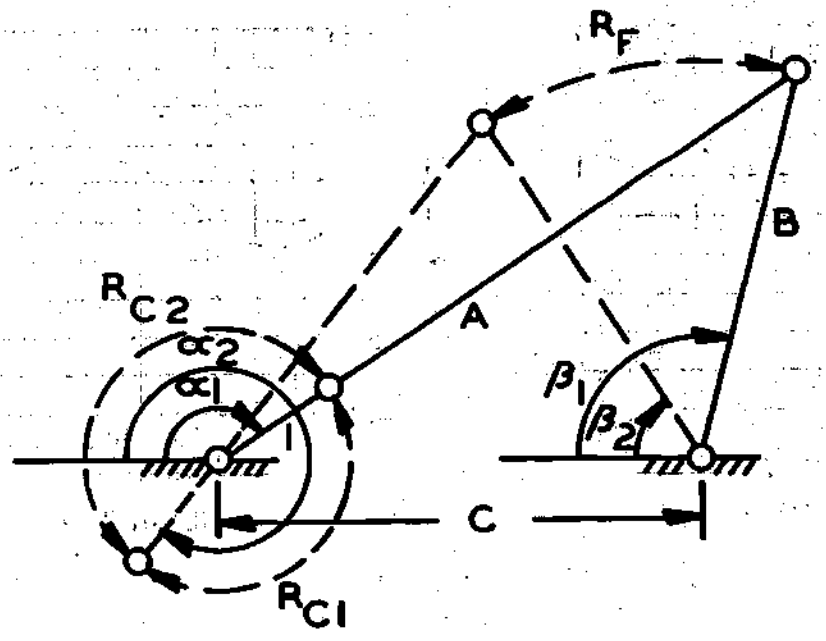
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 4.0

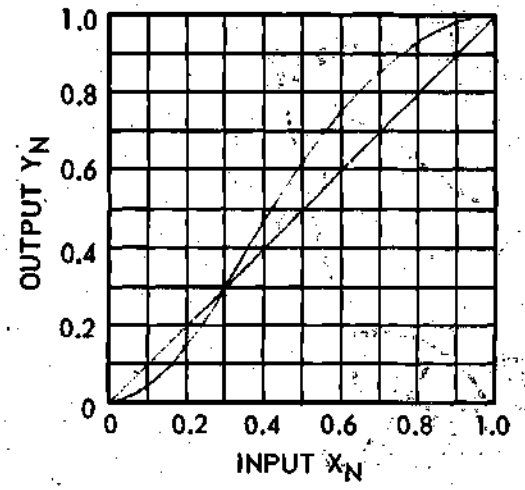
C = 4.5



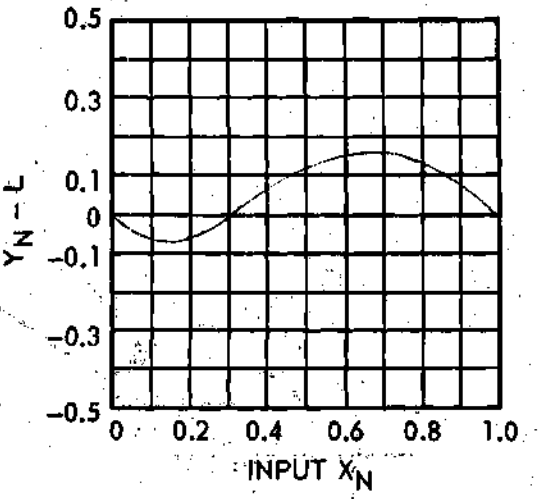
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 2.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.337195	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.518138
C = 5.0	$R_{C2} = 2\pi - R_{C1} =$ 2.945990	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037770	-0.062230	0.016480	-0.083520
0.144549	-0.055451	0.070922	-0.129078
0.297527	-0.002473	0.167430	-0.132570
0.465006	0.065006	0.300909	-0.099091
0.621049	0.121049	0.457173	-0.042827
0.752630	0.152630	0.618553	0.018552
0.856487	0.156487	0.768029	0.068029
0.933059	0.133059	0.890186	0.090185
0.982089	0.082089	0.971241	0.071241
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

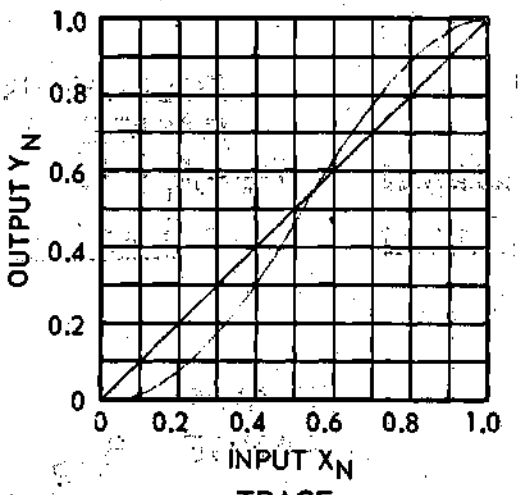


TRACE

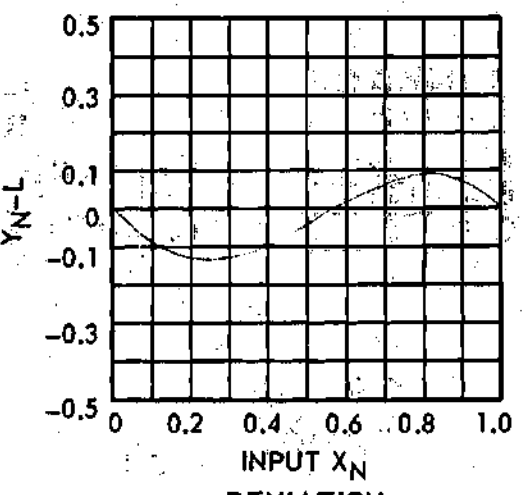


DEVIATION

CRANK RANGE RC1



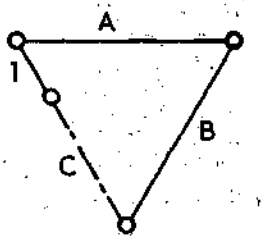
TRACE



DEVIATION

CRANK RANGE RC2

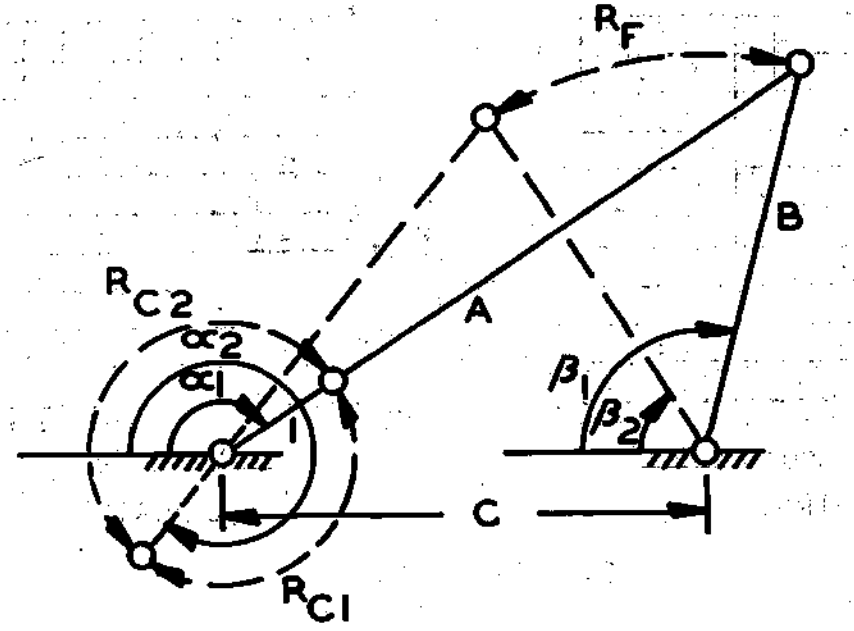
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 2.5

B = 4.0

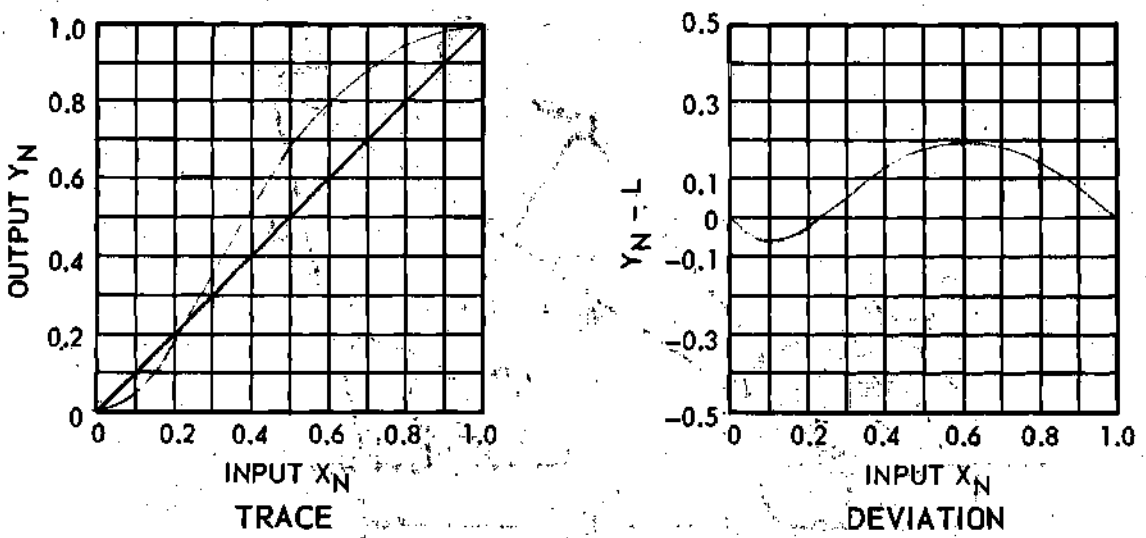
C = 5.0



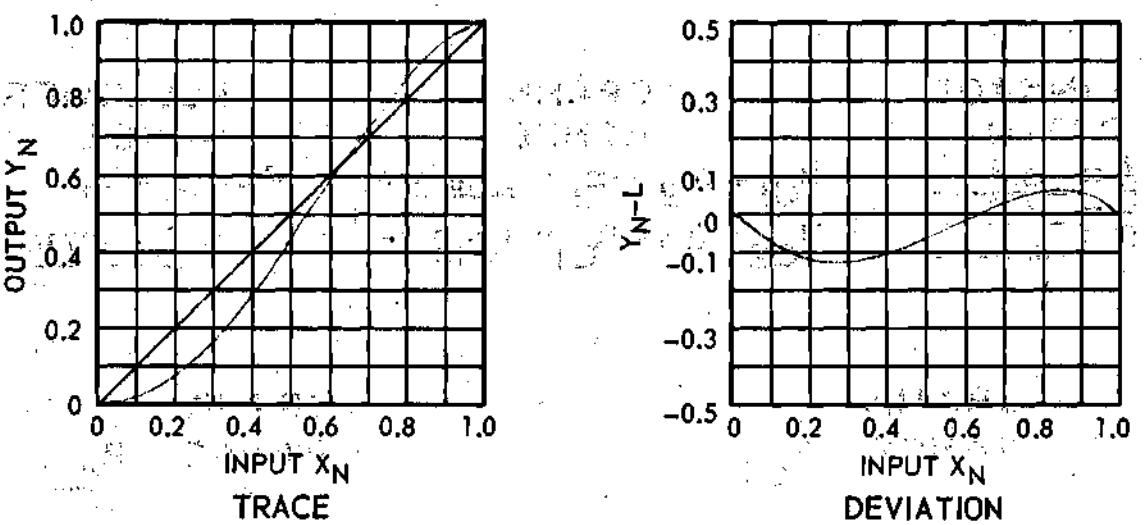
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.005265	$R_F = \beta_1 - \beta_2$
B = 1.5	$R_{C2} = 2\pi - R_{C1} =$ 3.277920	= 1.492595
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.045872	-0.054128	0.018909	-0.081091
0.179721	-0.020279	0.077495	-0.122505
0.358025	0.058025	0.172759	-0.127241
0.531110	0.131110	0.295302	-0.104698
0.676919	0.176919	0.434250	-0.065750
0.792567	0.192567	0.580046	-0.019954
0.881081	0.181081	0.723866	0.023866
0.945264	0.145264	0.855121	0.055121
0.985648	0.085648	0.957005	0.057005
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

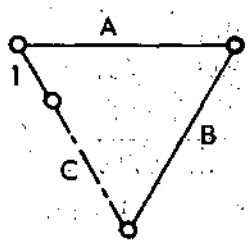


CRANK RANGE RC1



CRANK RANGE RC2

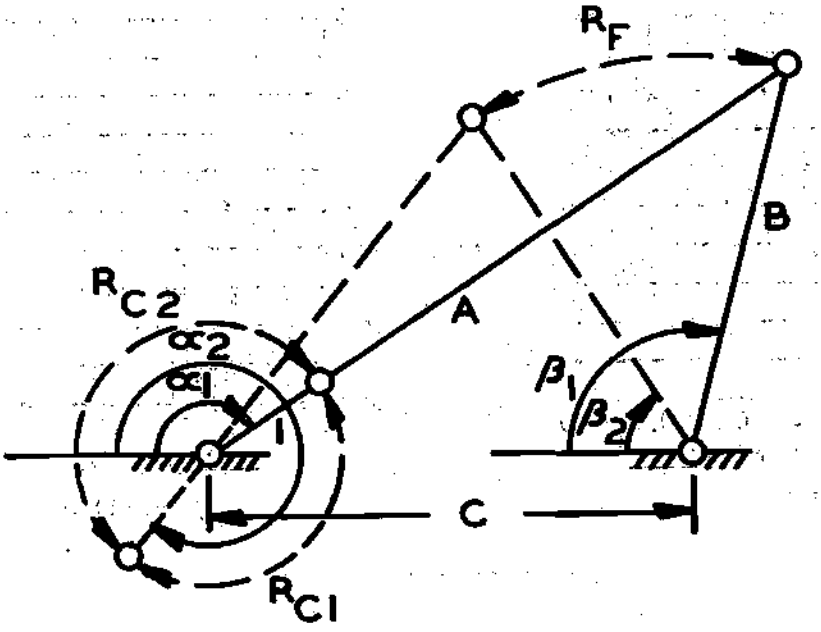
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 1.5

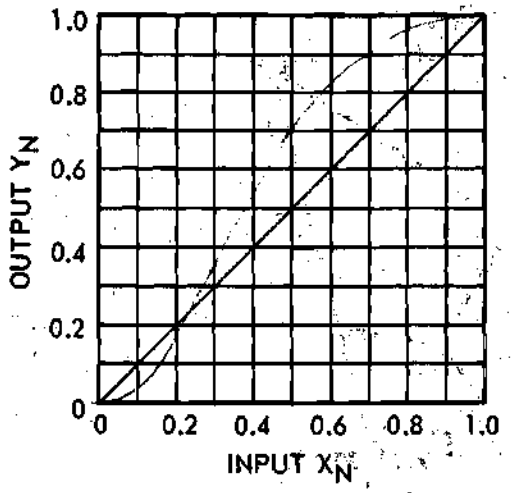
C = 3.0



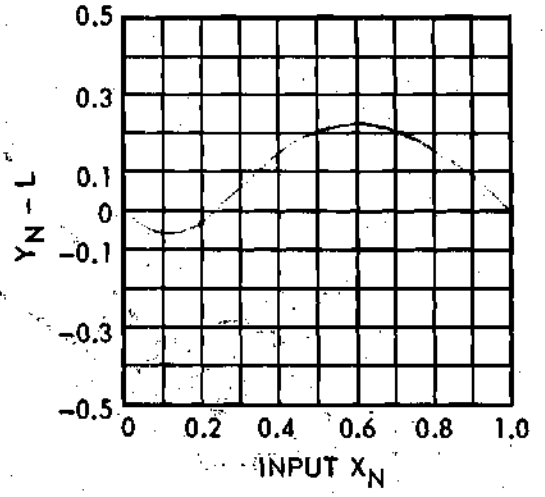
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.667370	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.615815	= 1.287736
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.040850	-0.059150	0.016964	-0.083036
0.170797	-0.029203	0.066740	-0.133260
0.360002	0.060002	0.147512	-0.152488
0.550171	0.150171	0.255946	-0.144054
0.706836	0.206836	0.386563	-0.113437
0.823847	0.223847	0.532036	-0.067964
0.906161	0.206161	0.683307	-0.016693
0.960063	0.160063	0.828204	0.028204
0.990337	0.090337	0.946728	0.046728
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

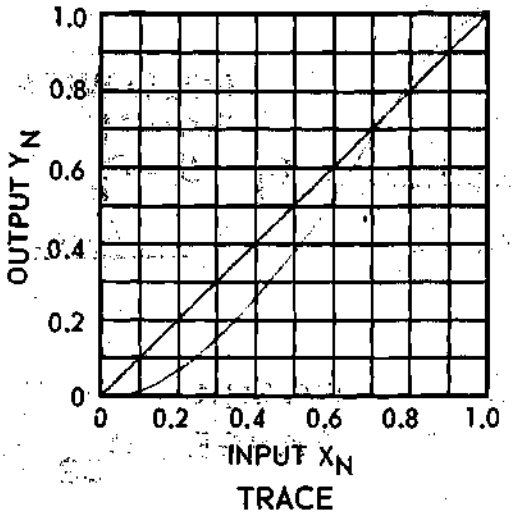


TRACE

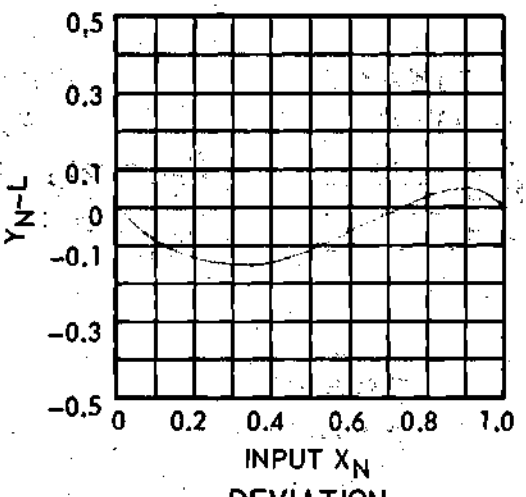


DEVIATION

CRANK RANGE RC1



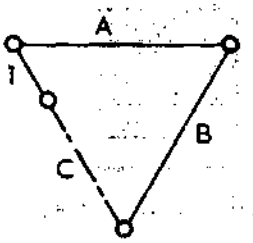
TRACE



DEVIATION

CRANK RANGE RC2

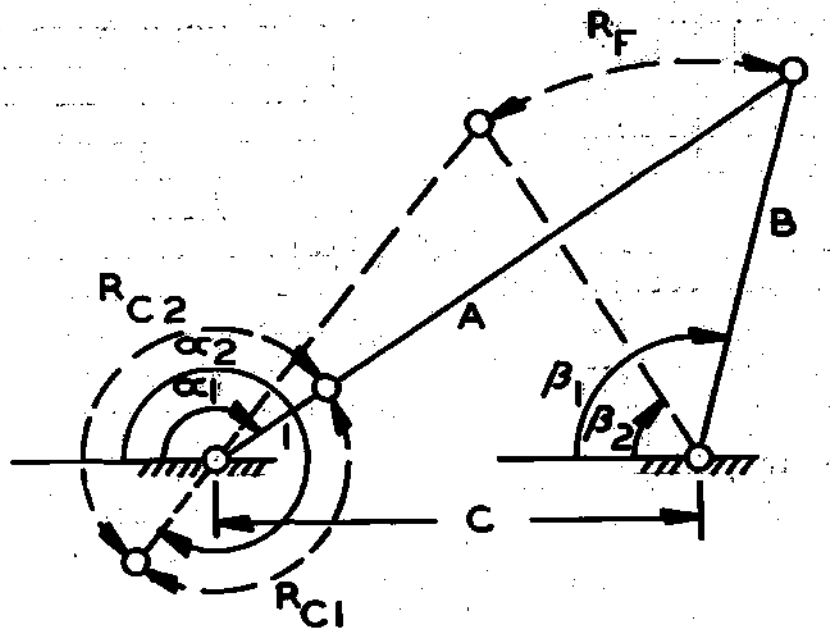
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.0

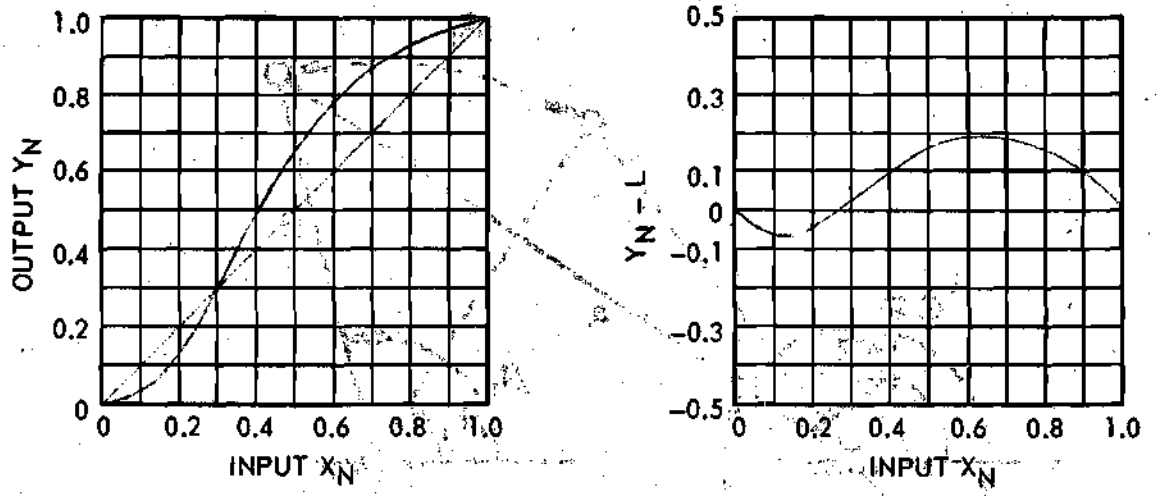
C = 2.5



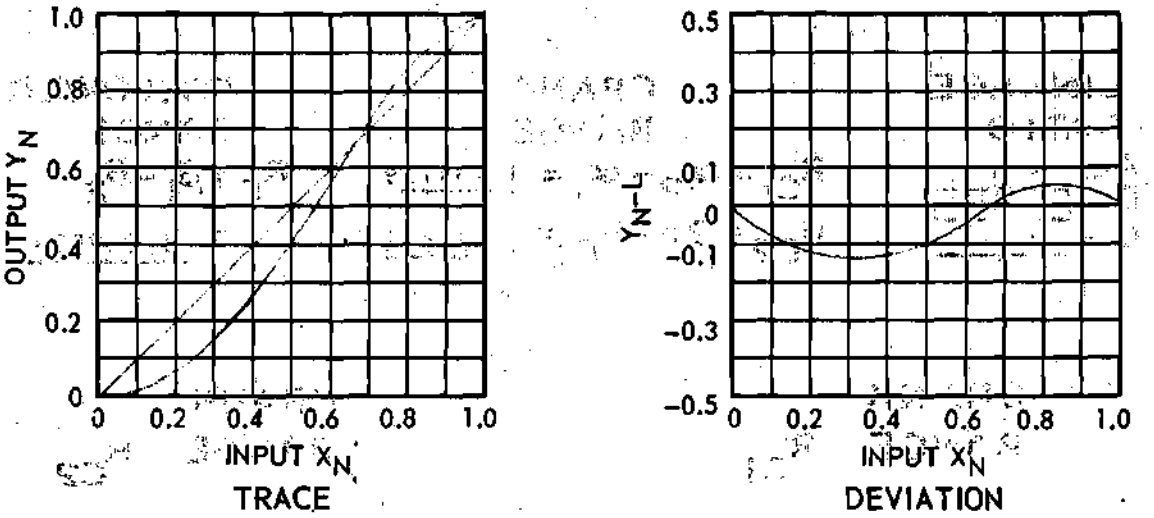
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.924219	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.358966	= 1.100742
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.038242	-0.061758	0.017473	-0.082527
0.154120	-0.045880	0.070614	-0.129386
0.323711	0.023711	0.158577	-0.141423
0.503723	0.103723	0.276646	-0.123354
0.662541	0.162541	0.416534	-0.083466
0.789009	0.189009	0.567880	-0.032120
0.883277	0.183277	0.718947	0.018947
0.948472	0.148472	0.855569	0.055569
0.987081	0.087081	0.958415	0.058415
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

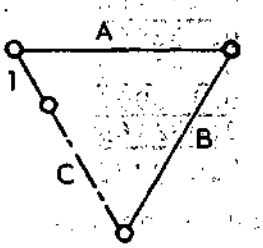


CRANK RANGE RG1

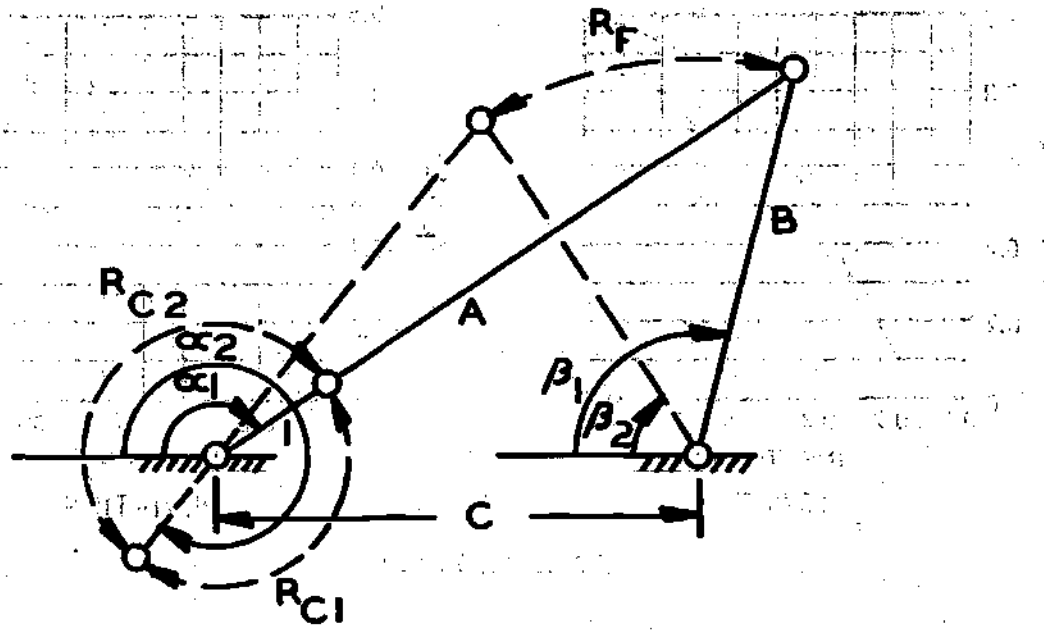


CRANK RANGE RG2

SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



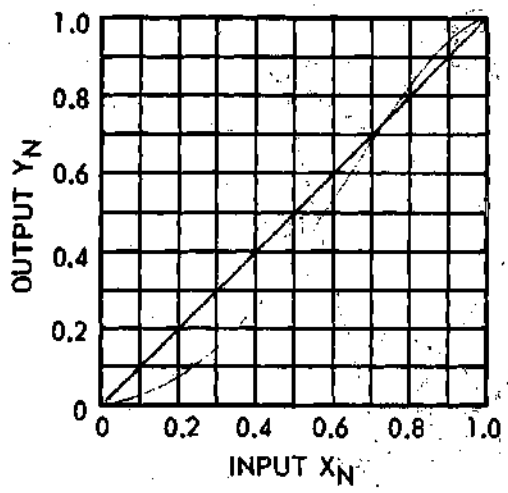
A = 3.0
B = 2.0
C = 3.0



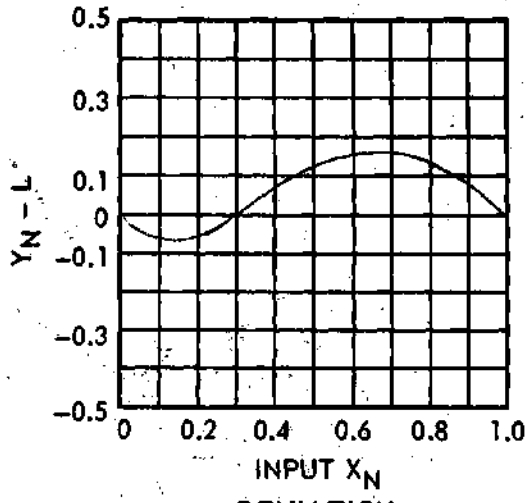
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.159739	$R_F = \beta_1 - \beta_2$
B = 2.0		
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.123446	= 1.047578

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037629	-0.062371	0.019437	-0.080563
0.147342	-0.052658	0.080597	-0.119403
0.304798	0.004798	0.181694	-0.118306
0.473669	0.073669	0.312860	-0.087140
0.627766	0.127766	0.460838	-0.039162
0.756558	0.156558	0.612837	0.012837
0.858430	0.158430	0.756823	0.056823
0.933997	0.133997	0.879986	0.079986
0.982465	0.082465	0.967027	0.067027
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

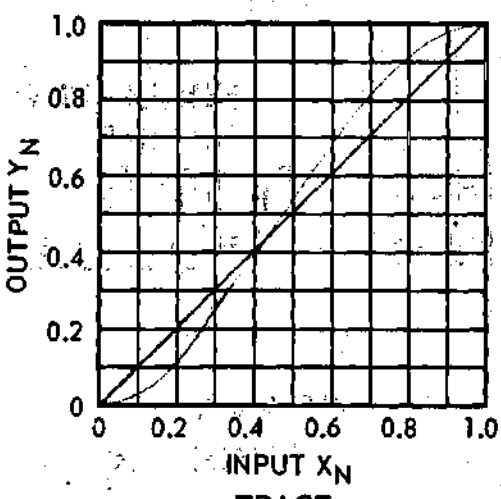


TRACE

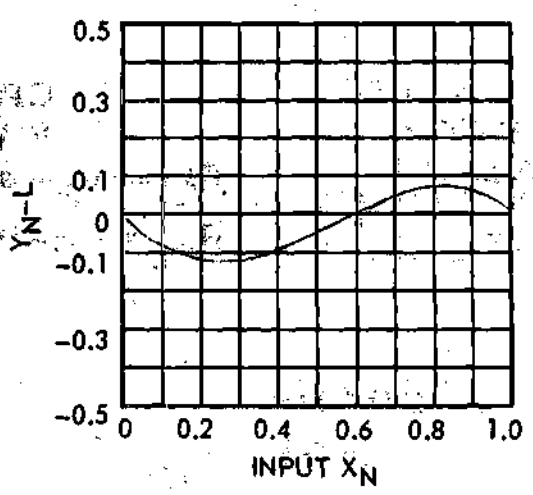


DEVIATION

CRANK RANGE RC1



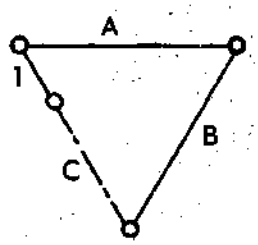
TRACE



DEVIATION

CRANK RANGE RC2

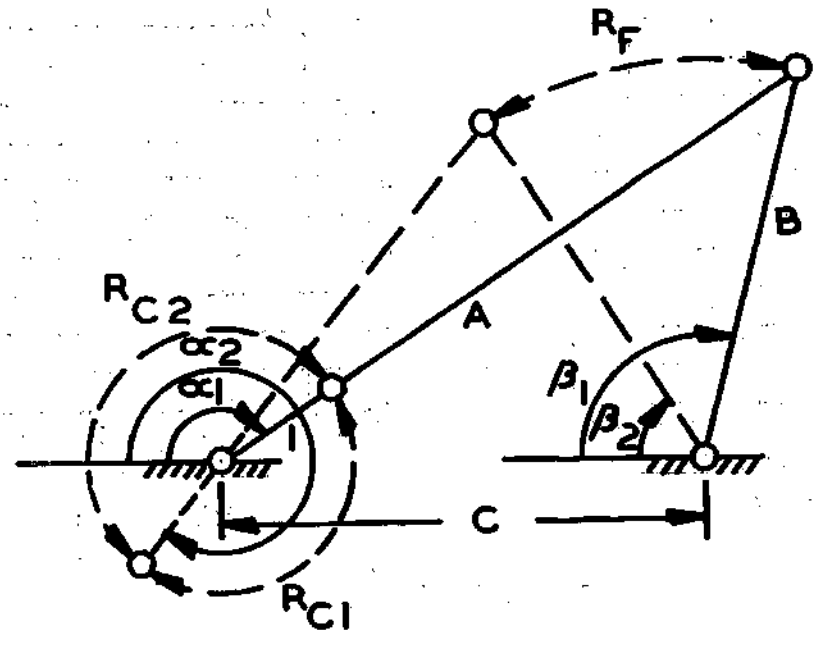
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.0

C = 3.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.328080	$R_F = \beta_1 - \beta_2$
B = 2.5		= 1.287736
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.955105	

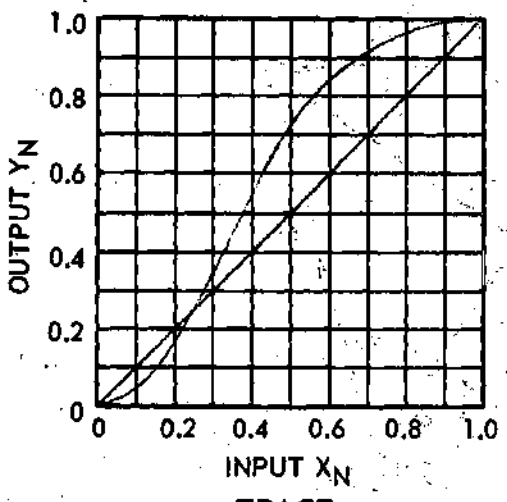
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.032390	-0.067610
0.146209	-0.053791
0.336075	0.036075
0.543813	0.143813
0.715356	0.215356
0.837440	0.237440
0.917735	0.217735
0.966681	0.166681
0.992308	0.092308
1.000000	0.000000

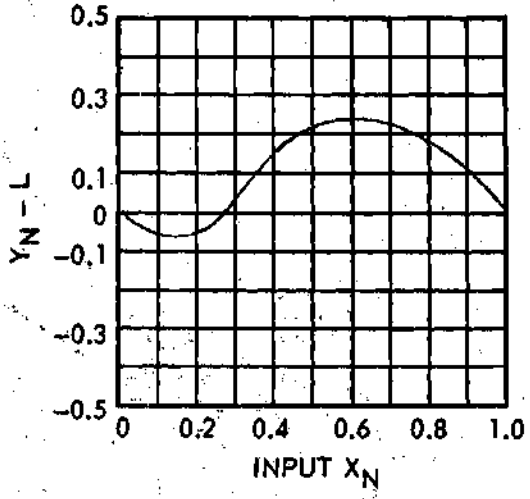
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.018926	-0.081074
0.070583	-0.129417
0.150185	-0.149815
0.254399	-0.145601
0.379462	-0.120538
0.520205	-0.079795
0.669354	-0.030646
0.815982	0.015982
0.940590	0.040590
1.000000	0.000000

All angles measured in radians.

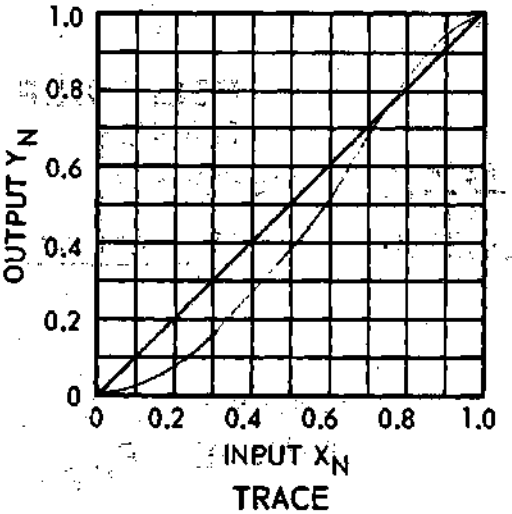


TRACE

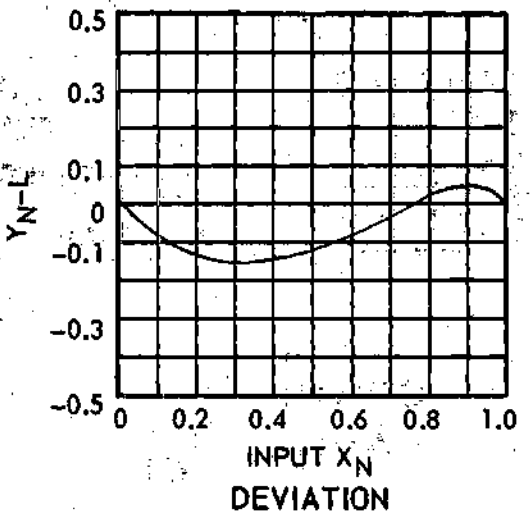


DEVIATION

CRANK RANGE RC1



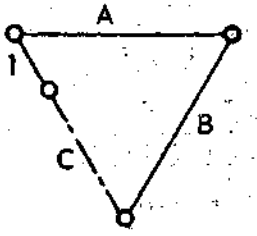
TRACE



DEVIATION

CRANK RANGE RC2

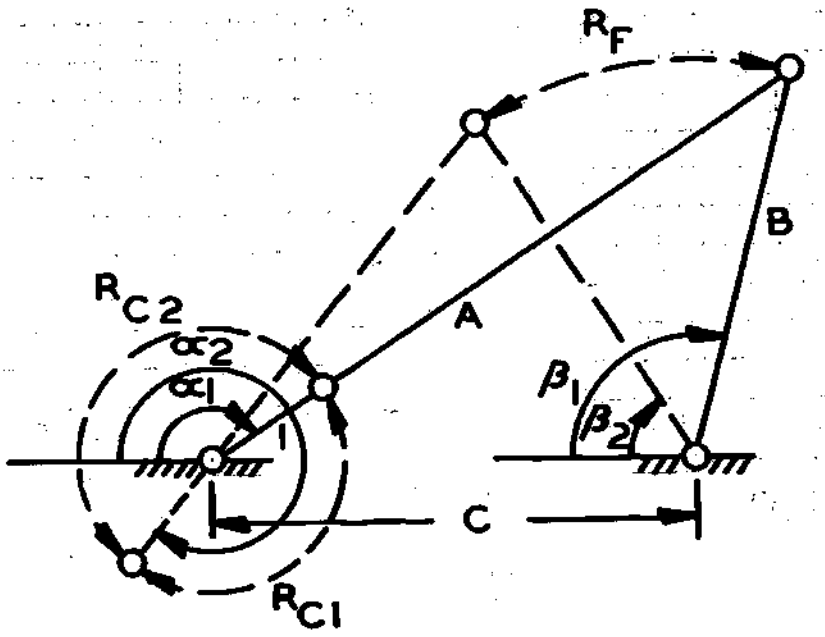
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.5

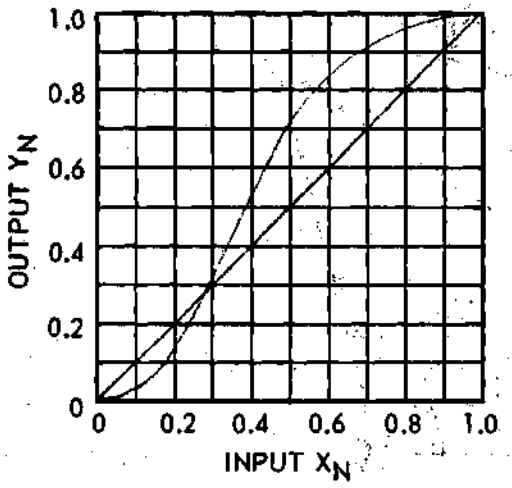
C = 2.0



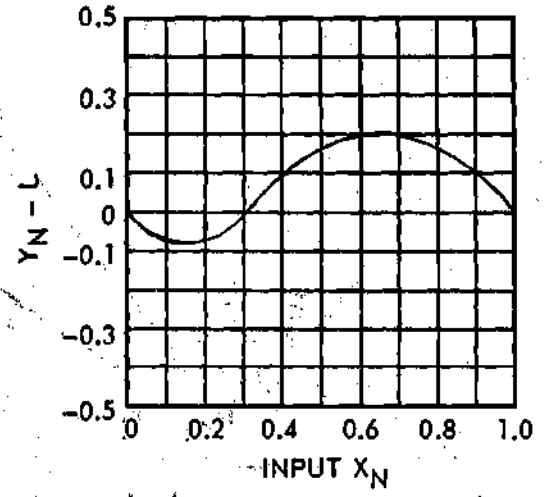
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.625814	$R_F = \beta_1 - \beta_2$
B = 2.5		= 1.031557
C = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.657371	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032940	-0.067060	0.018015	-0.081985
0.139638	-0.060362	0.069557	-0.130442
0.309802	0.009802	0.151807	-0.148193
0.501834	0.101834	0.261586	-0.138414
0.673083	0.173083	0.393960	-0.106040
0.805014	0.205014	0.541601	-0.058399
0.897678	0.197678	0.694378	-0.005622
0.957246	0.157246	0.838161	0.038161
0.989853	0.089854	0.951573	0.051573
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

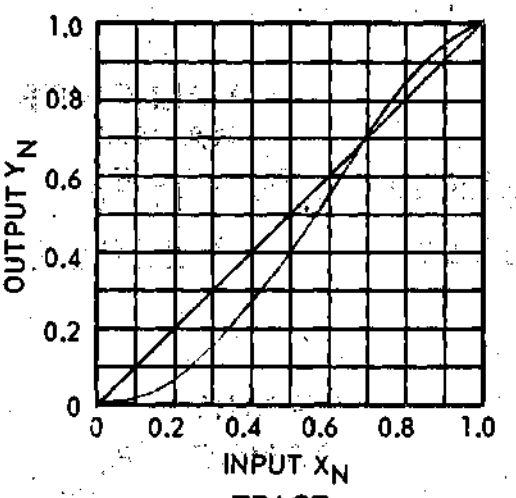


TRACE

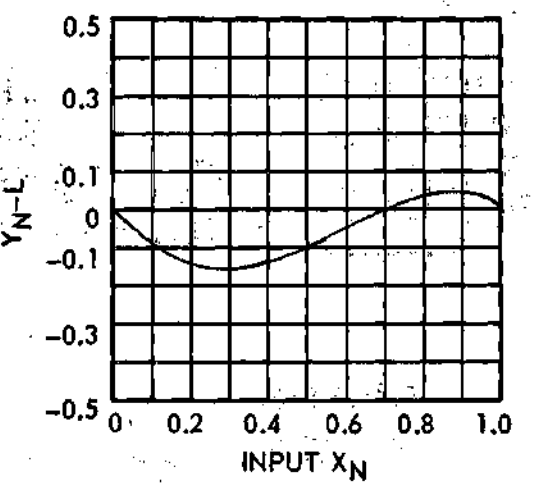


DEVIATION

CRANK RANGE DC1



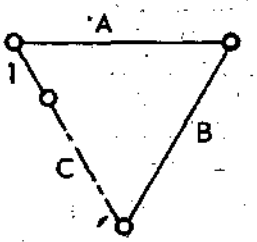
TRACE



DEVIATION

CRANK RANGE DC2

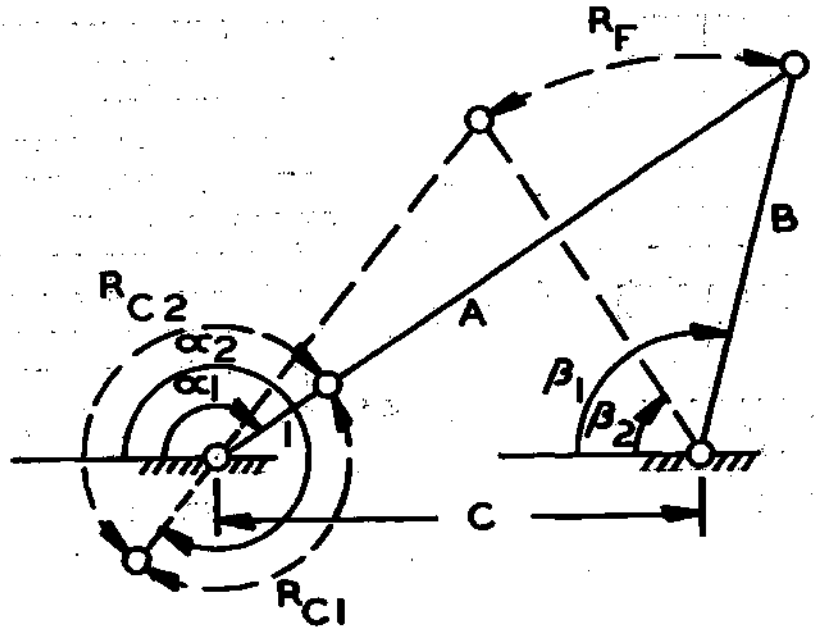
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.5

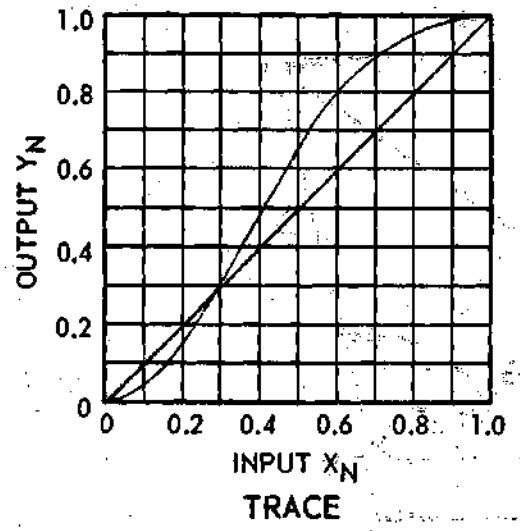
C = 2.5

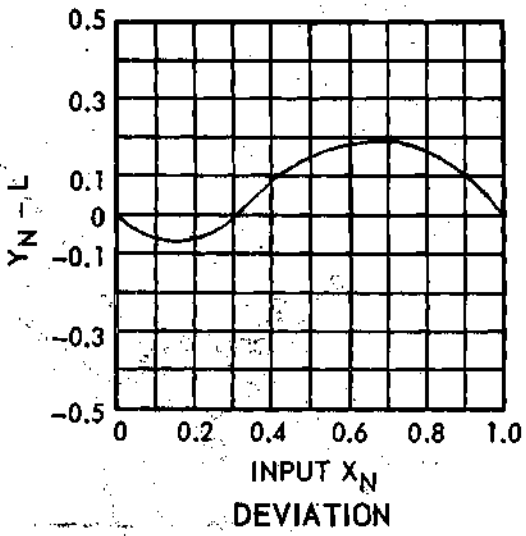


LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.842333	$R_F = \beta_1 - \beta_2$
B = 2.5		= 0.898083
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.440852	

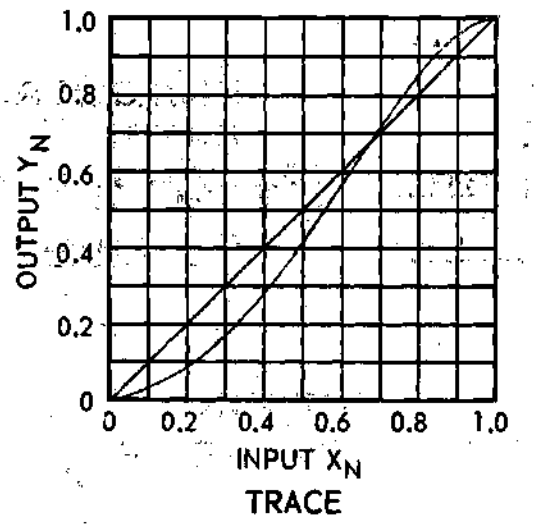
CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034253	-0.065747	0.017523	-0.082477
0.139904	-0.060096	0.069546	-0.130454
0.302048	0.002048	0.154808	-0.145192
0.484065	0.084065	0.269954	-0.130046
0.650745	0.150745	0.408487	-0.091513
0.784755	0.184755	0.560808	-0.039192
0.883379	0.183379	0.714518	0.014518
0.949760	0.149760	0.853908	0.053908
0.987725	0.087725	0.958235	0.058235
1.000000	0.000000	1.000000	0.000000

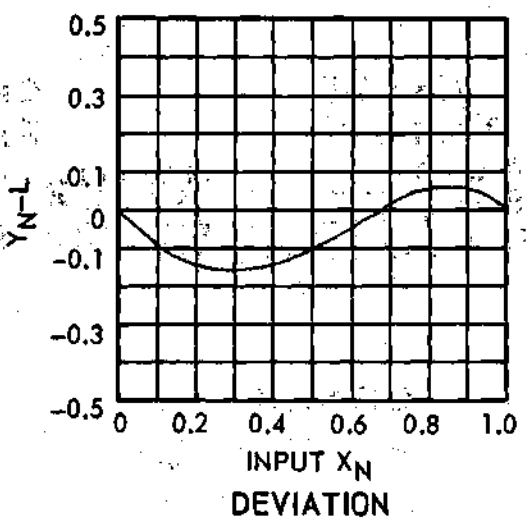
All angles measured in radians.





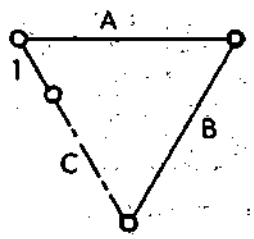
CRANK RANGE RC1





CRANK RANGE RC2

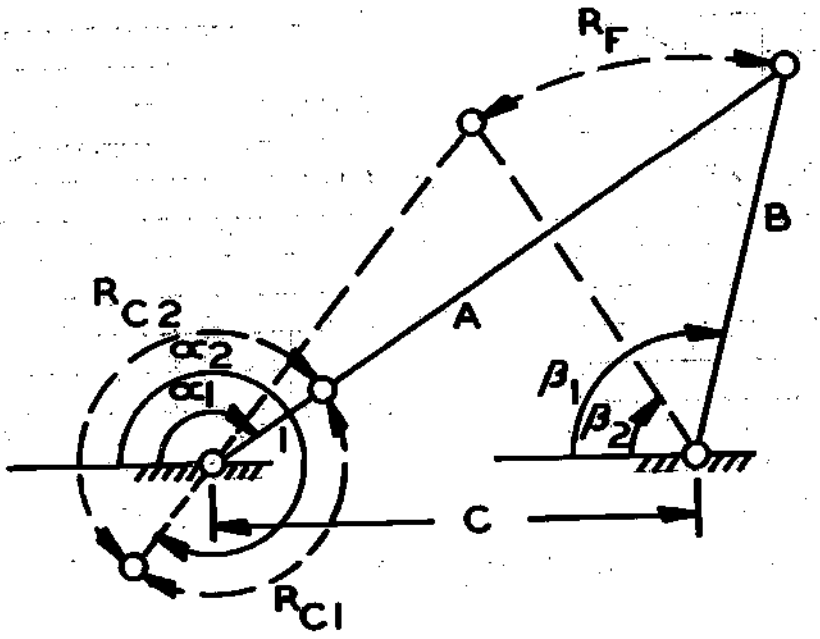
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.5

C = 3.0



LINKAGE RATIO

A = 3.0
B = 2.5
C = 3.5

CRANK RANGE

$R_{C1} = \alpha_2 - \alpha_1 =$ 3.033345

$R_{C2} = 2\pi - R_{C1} =$ 3.249840

FOLLOWER RANGE

$R_F = \beta_1 - \beta_2$

$=$ 0.833204

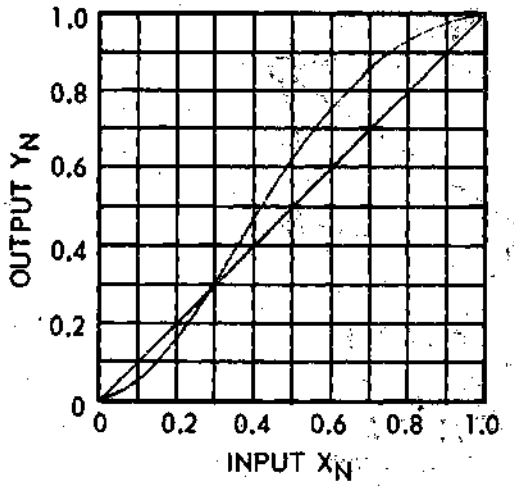
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.035389	-0.064611
0.140583	-0.059417
0.297068	-0.002932
0.471002	0.071002
0.632519	0.132519
0.766489	0.166489
0.869224	0.169224
0.941688	0.141688
0.985248	0.085248
1.000000	0.000000

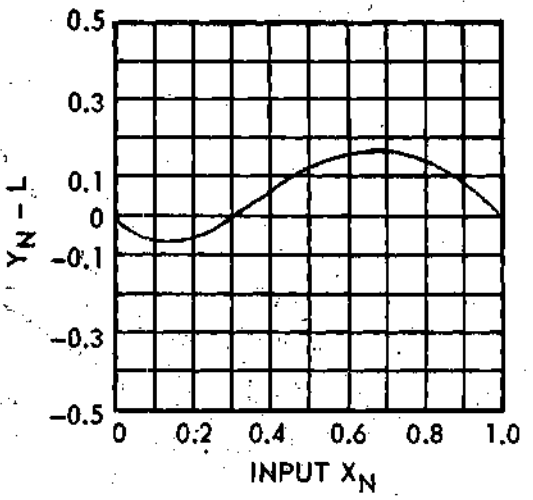
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.017640	-0.082360
0.071810	-0.128190
0.162354	-0.137646
0.284697	-0.115303
0.429659	-0.070341
0.585014	-0.014986
0.736787	0.036787
0.869213	0.069213
0.963893	0.063893
1.000000	0.000000

All angles measured in radians.

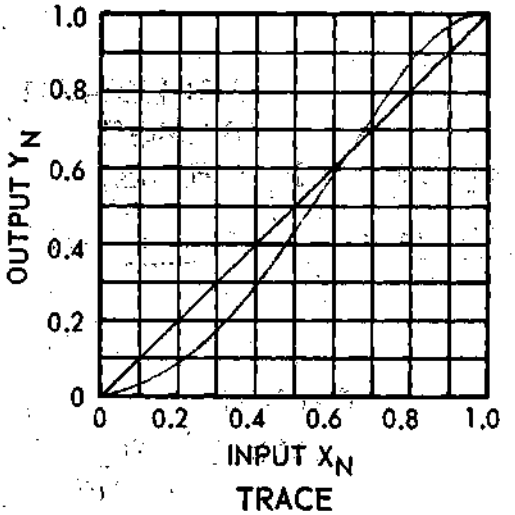


TRACE

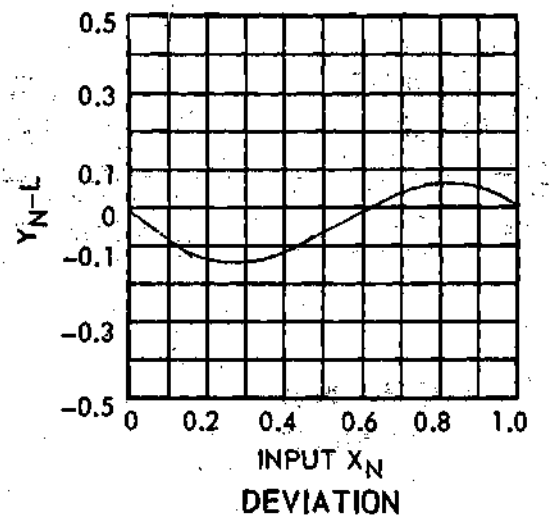


DEVIATION

CRANK RANGE RC1



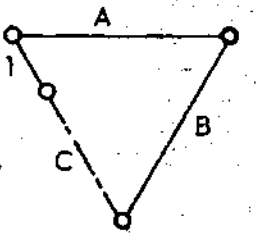
TRACE



DEVIATION

CRANK RANGE RC2

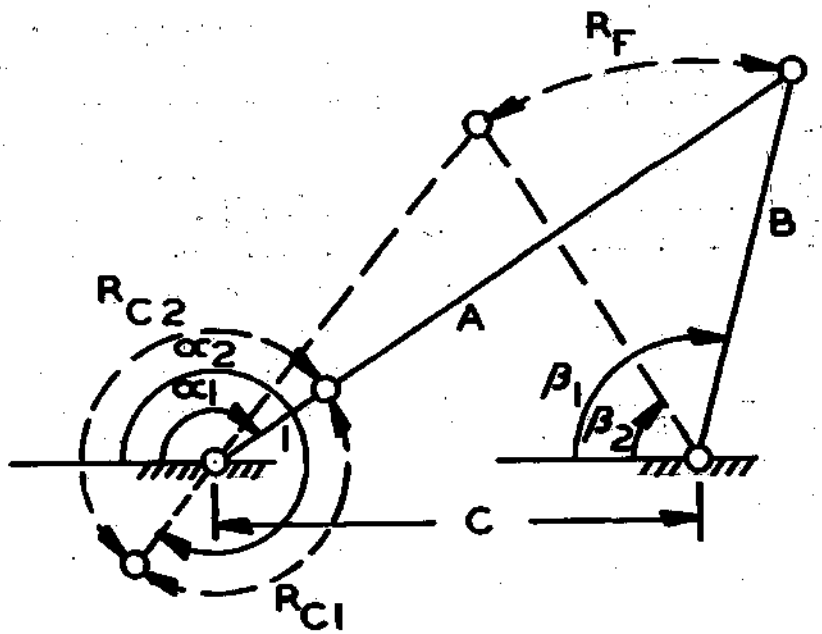
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.5

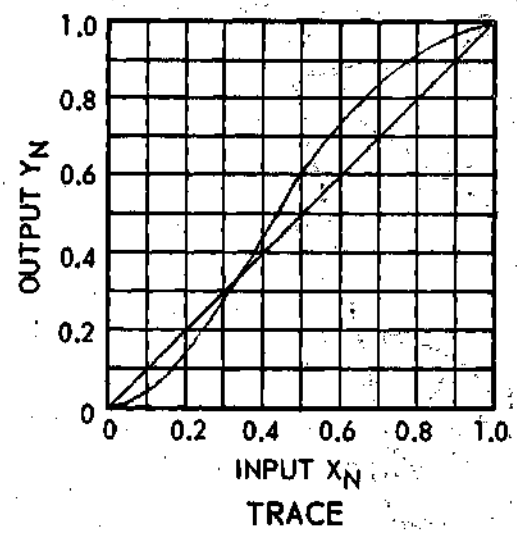
C = 3.5



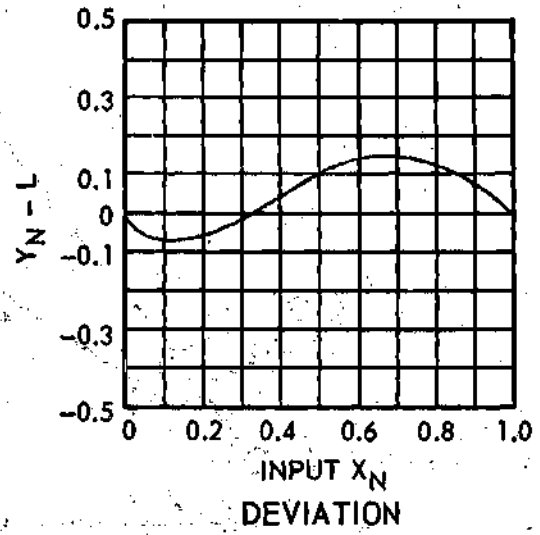
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.240490	$R_F = \beta_1 - \beta_2$
B = 2.5		= 0.831531
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.042695	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.036015	-0.063985	0.019380	-0.080620
0.139660	-0.060340	0.081012	-0.118988
0.289561	-0.010439	0.184088	-0.115912
0.454406	0.054406	0.318793	-0.081207
0.609244	0.109244	0.470662	-0.029338
0.741816	0.141816	0.625190	0.025190
0.848565	0.148565	0.768918	0.068918
0.928831	0.128831	0.888555	0.088555
0.980923	0.080932	0.970181	0.070181
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

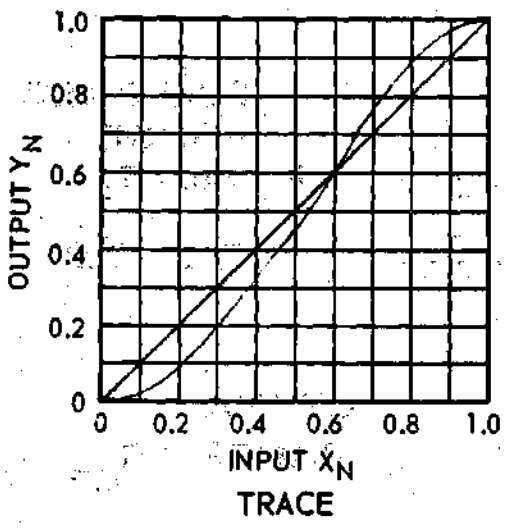


TRACE

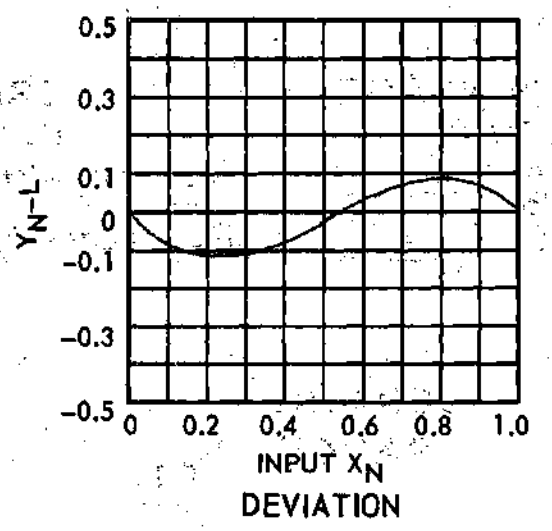


DEVIATION

CRANK RANGE RC1



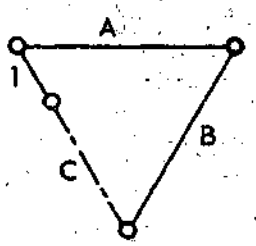
TRACE



DEVIATION

CRANK RANGE RC2

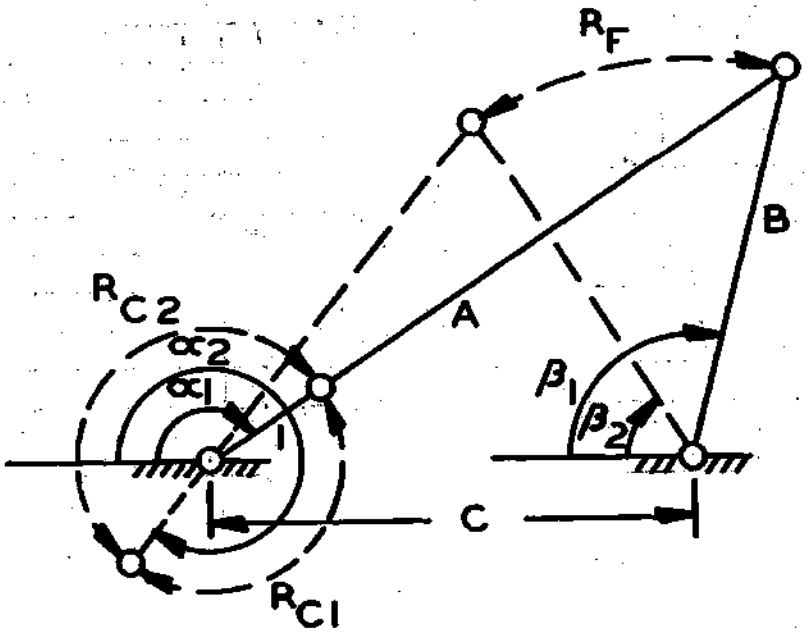
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 2.5

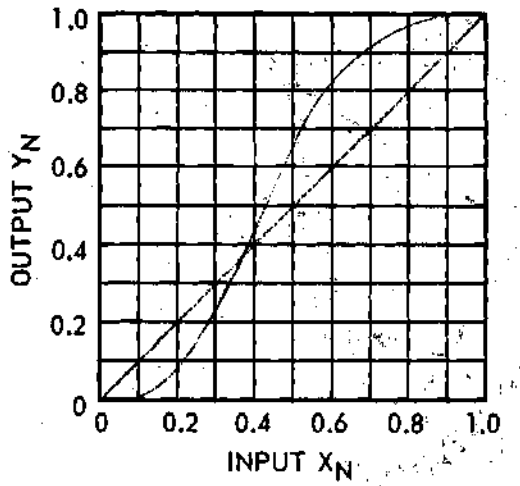
C = 4.0



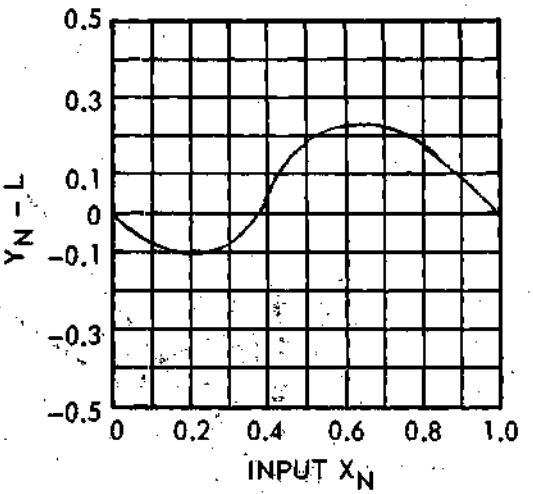
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 1.785325	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 4.497860	= 1.492595
C = 1.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.017949	-0.082051	0.026291	-0.073709
0.087563	-0.112437	0.087646	-0.112354
0.236022	-0.063978	0.172159	-0.127841
0.459904	0.059904	0.275507	-0.124493
0.681429	0.181429	0.395163	-0.104837
0.834868	0.234868	0.528118	-0.071882
0.924089	0.224089	0.669545	-0.030455
0.971722	0.171722	0.811081	0.011081
0.993923	0.093923	0.935973	0.035973
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

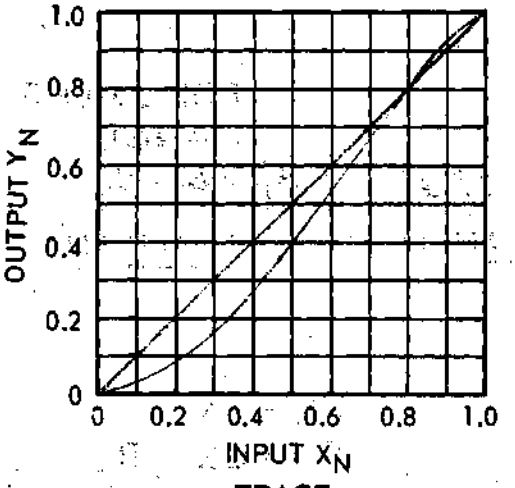


TRACE

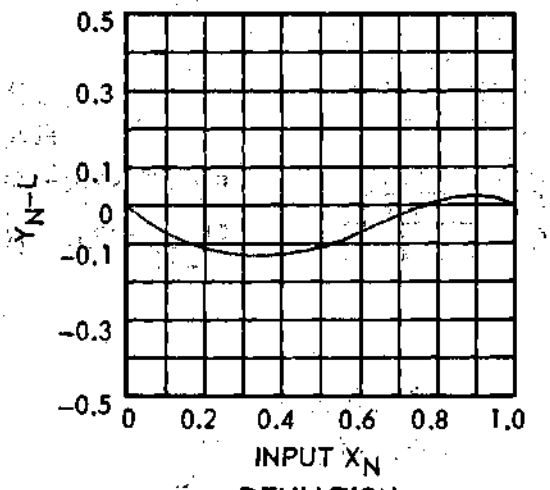


DEVIATION

GRASHOF RATIO 101



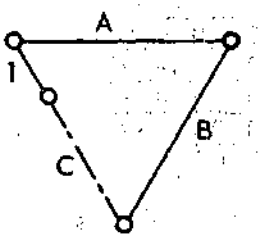
TRACE



DEVIATION

GRASHOF RATIO 102

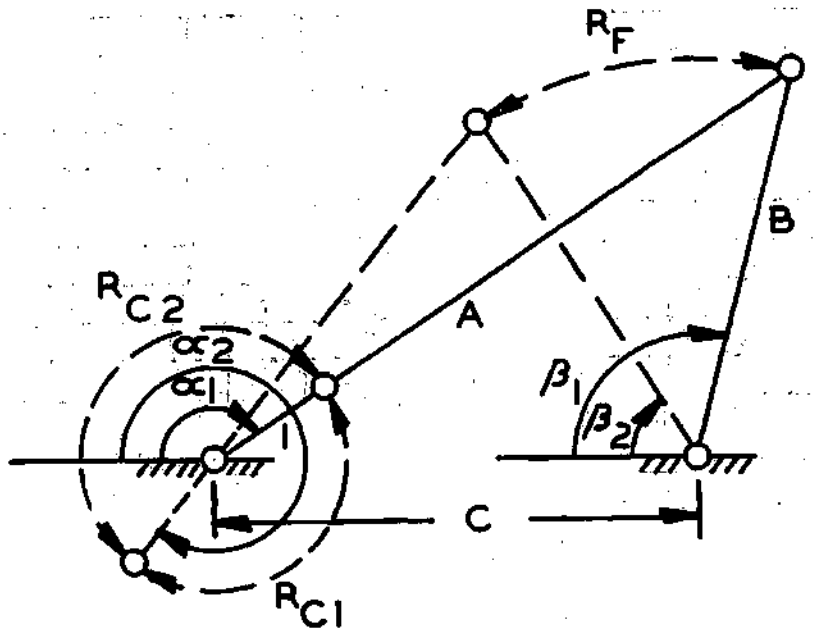
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

C = 1.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 = 2.258224$	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} = 4.024961$	$= 1.100742$
C = 2.0		

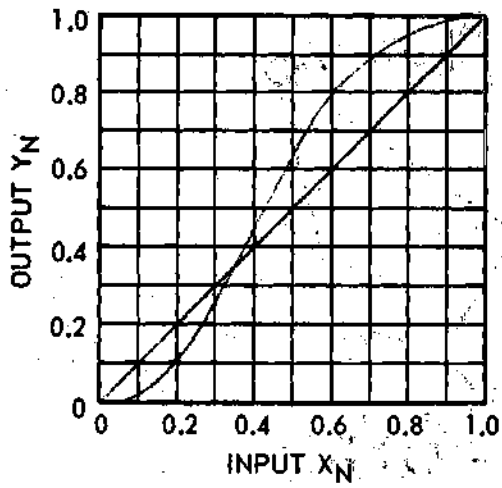
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.024306	-0.075694
0.109247	-0.090753
0.263752	-0.036248
0.464511	0.064511
0.658025	0.158025
0.806029	0.206029
0.903918	0.203918
0.962078	0.162078
0.991469	0.091469
1.000000	0.000000

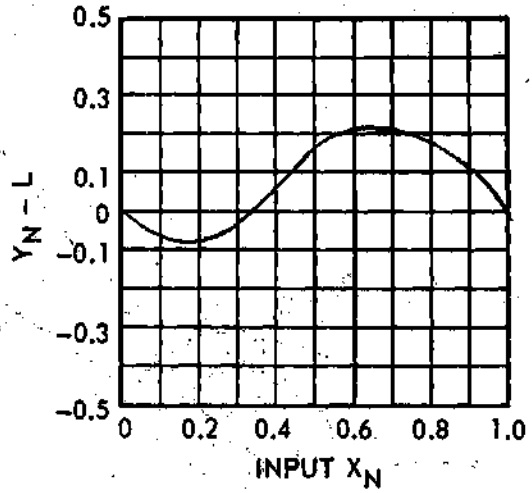
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.021629	-0.078371
0.078041	-0.121959
0.161894	-0.138106
0.269122	-0.130878
0.396016	-0.103984
0.537513	-0.062487
0.685917	-0.014083
0.829155	0.029155
0.946762	0.046762
1.000000	0.000000

All angles measured in radians.

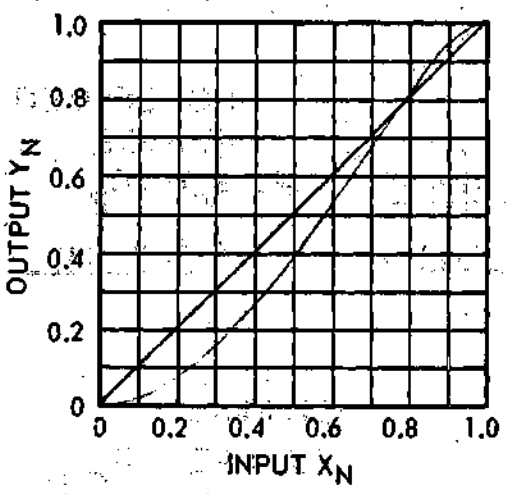


TRACE

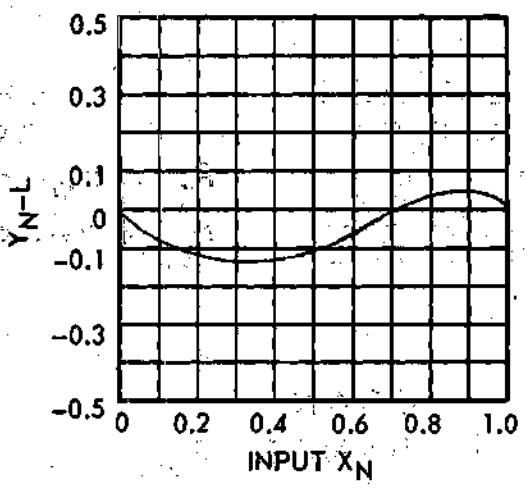


DEVIATION

CRANK RANGE RC1



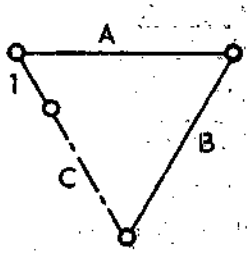
TRACE



DEVIATION

CRANK RANGE RC2

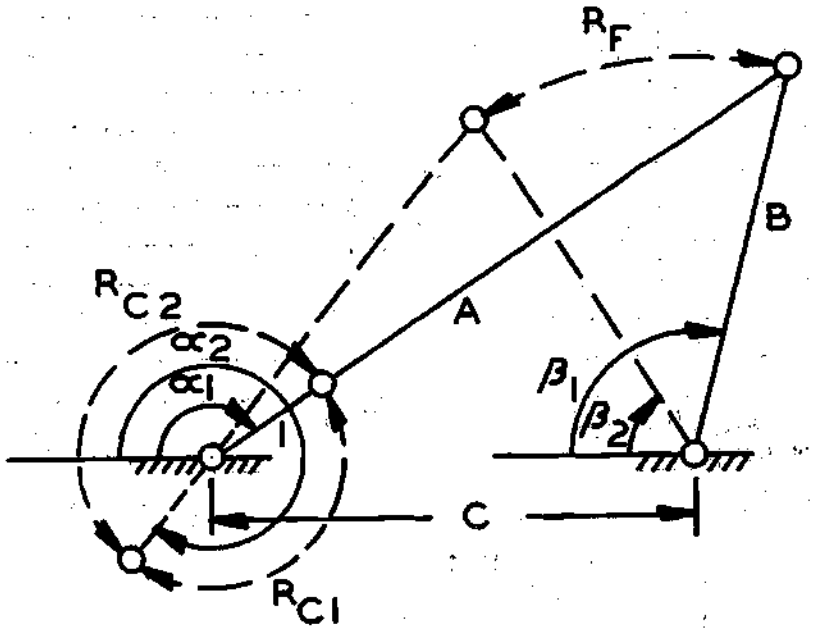
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

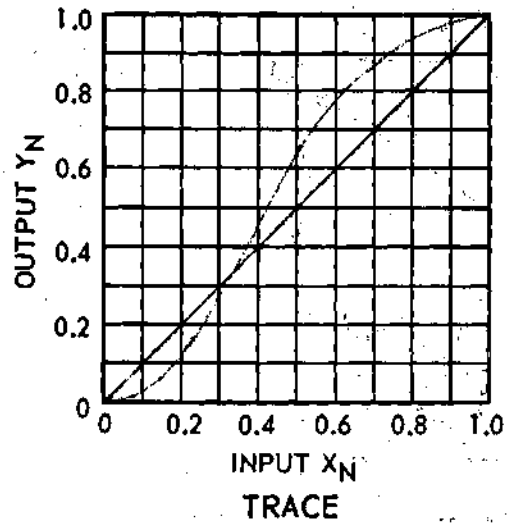
C = 2.0



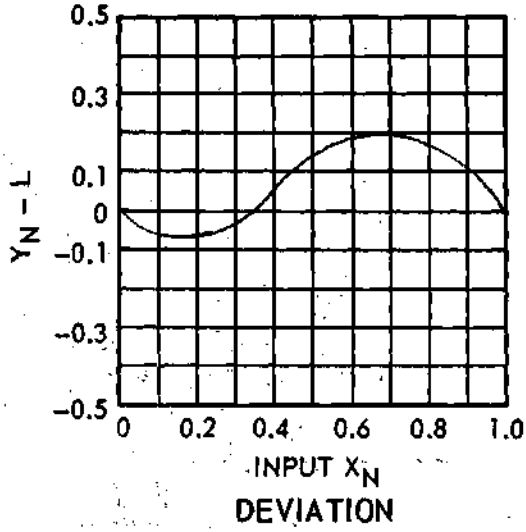
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 = 2.542769$	$R_F = \beta_1 - \beta_2$
B = 3.0		
C = 2.5	$R_{C2} = 2\pi - R_{C1} = 3.740416$	$= 0.898083$

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.028247	-0.071753	0.019419	-0.080581
0.120870	-0.079130	0.073221	-0.126779
0.276237	-0.023763	0.156960	-0.143040
0.465852	0.065852	0.267132	-0.132868
0.646813	0.146813	0.399228	-0.100772
0.790793	0.190793	0.546433	-0.053567
0.891913	0.191913	0.698692	-0.001308
0.955705	0.155705	0.841441	0.041441
0.989701	0.089701	0.952979	0.052979
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

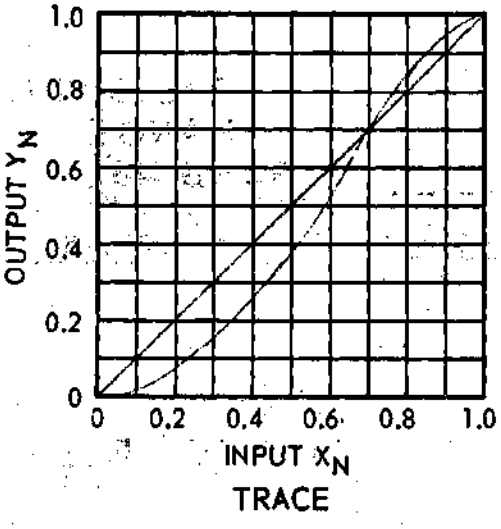


TRACE

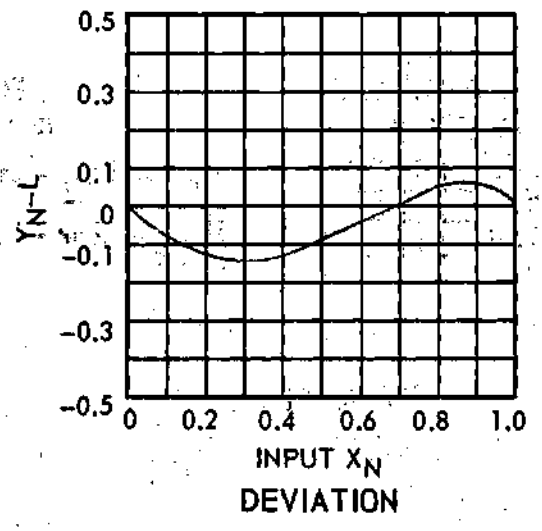


DEVIATION

CRANK RANGE RC1



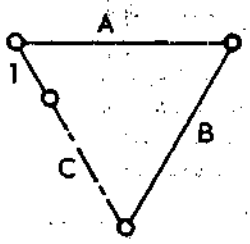
TRACE



DEVIATION

CRANK RANGE RC2

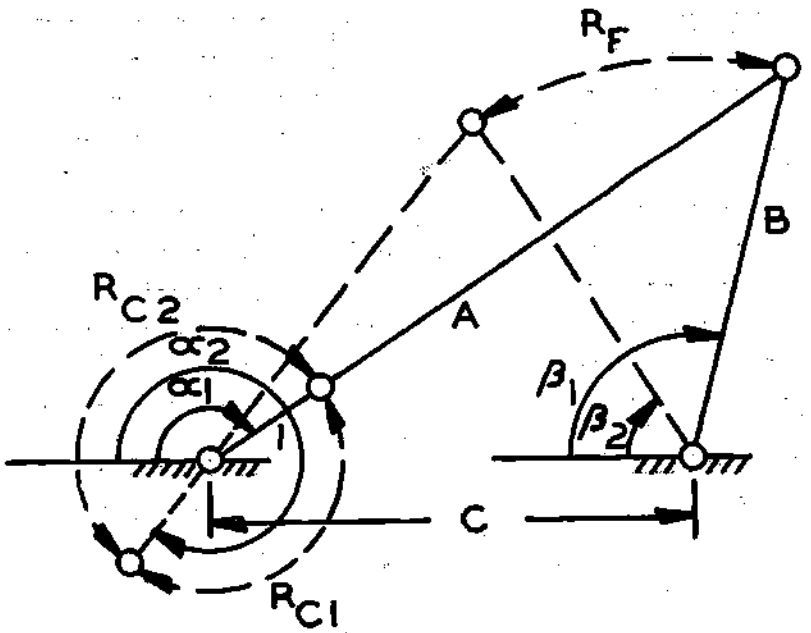
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

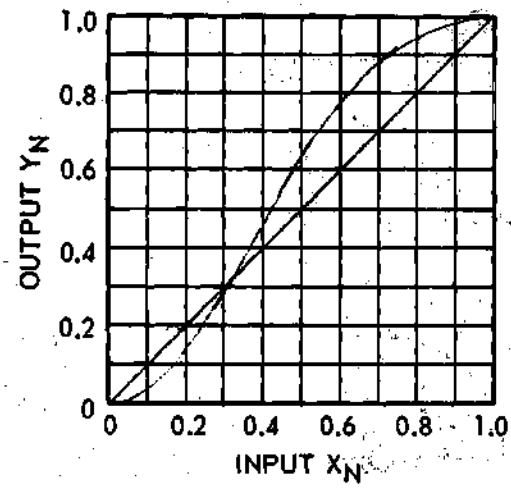
C = 2.5



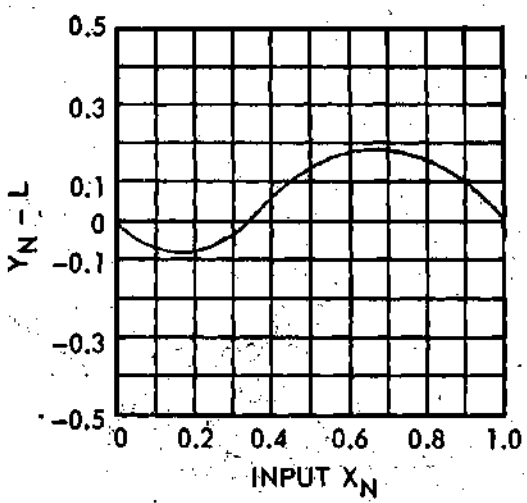
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.751702	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.531483	= 0.779781
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031025	-0.068975	0.018180	-0.081820
0.128250	-0.071750	0.070722	-0.129278
0.283092	-0.016908	0.155244	-0.144756
0.465335	0.065335	0.268625	-0.131375
0.638423	0.138423	0.405425	-0.094575
0.779477	0.179477	0.557026	-0.042974
0.882502	0.182502	0.711295	0.011295
0.950386	0.150386	0.852030	0.052030
0.988133	0.088133	0.957658	0.057658
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

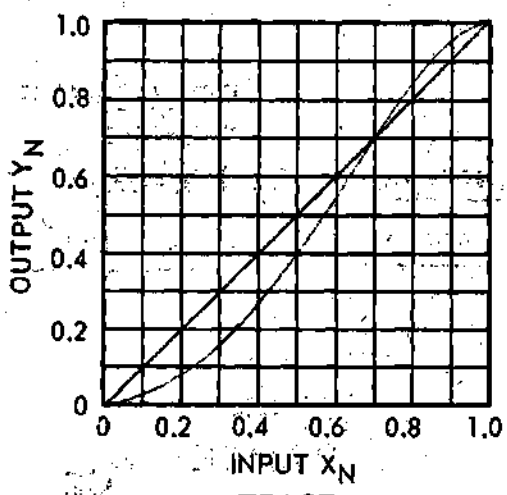


TRACE

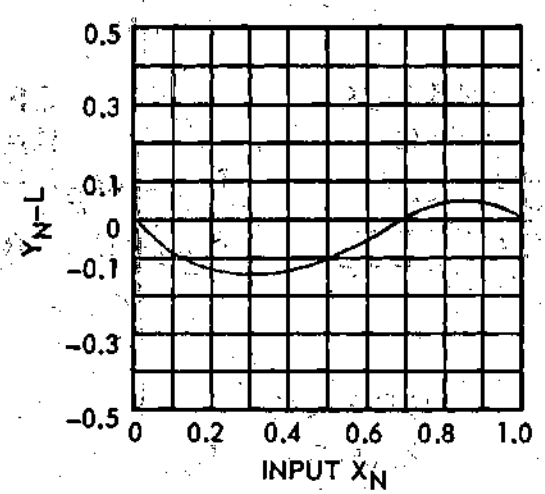


DEVIATION

CRANK RANGE RC1



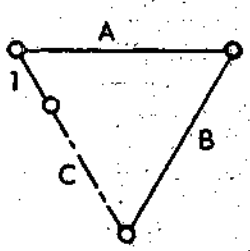
TRACE



DEVIATION

CRANK RANGE RC2

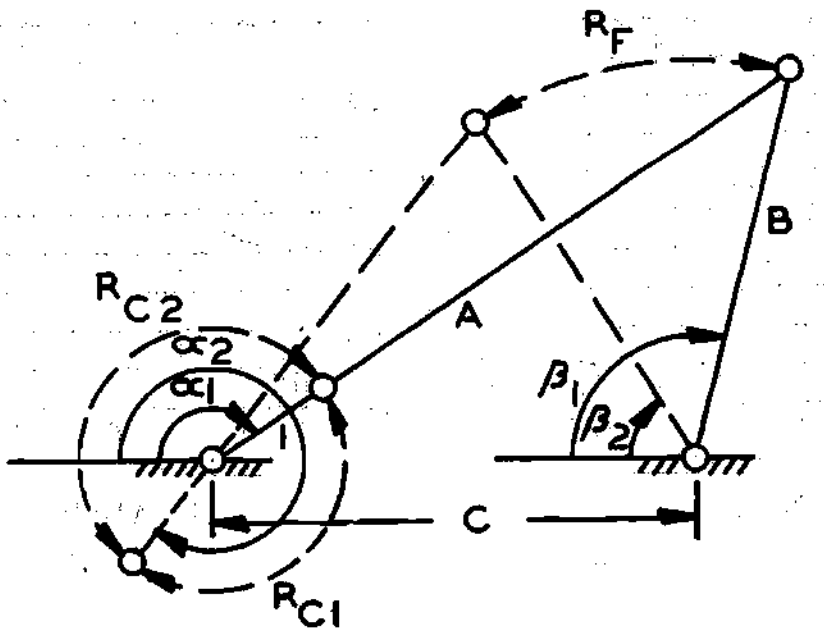
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

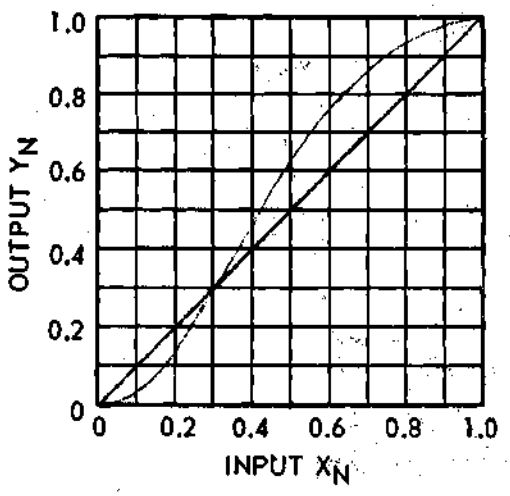
C = 3.0



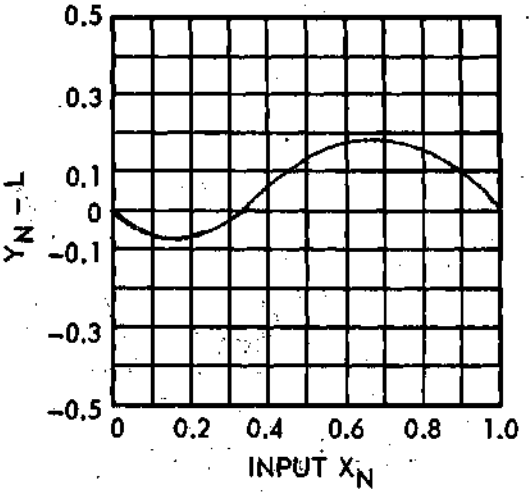
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.927896	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.355289	= 0.711231
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033094	-0.066906	0.017548	-0.082452
0.133169	-0.066831	0.070055	-0.129945
0.286609	-0.013391	0.156733	-0.143267
0.462822	0.062822	0.274401	-0.125599
0.629871	0.129871	0.416158	-0.083842
0.768622	0.168622	0.571285	-0.028715
0.873282	0.173282	0.725816	0.025816
0.944954	0.144954	0.862771	0.062771
0.986458	0.086458	0.961861	0.061861
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

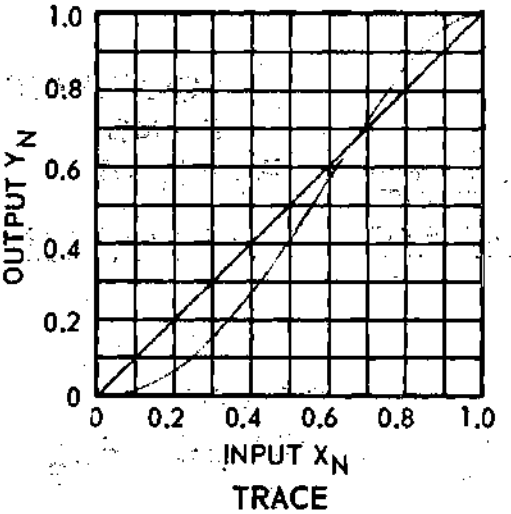


TRACE

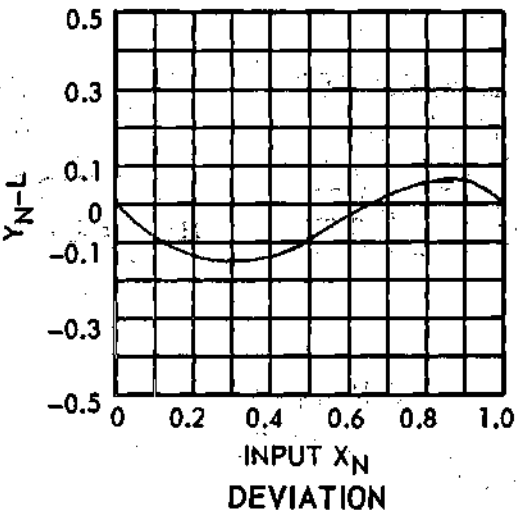


DEVIATION

CRANK RANGE RC1



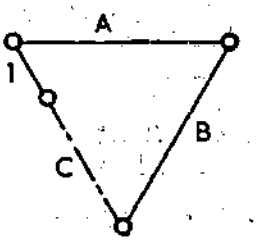
TRACE



DEVIATION

CRANK RANGE RC2

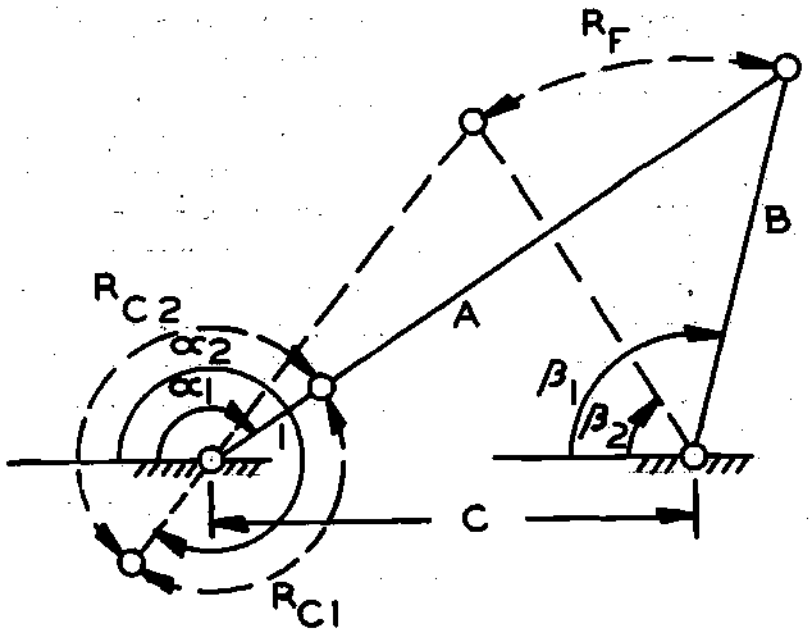
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

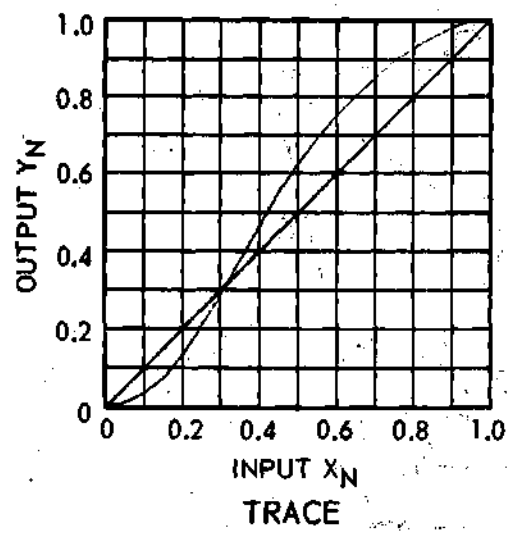
C = 3.5



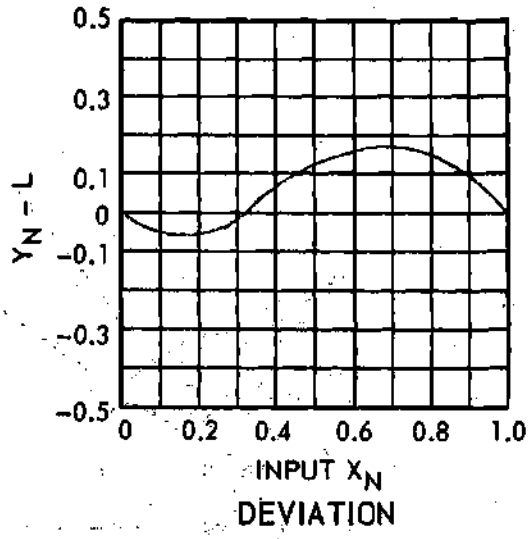
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.097630	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.185555	= 0.681039
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034612	-0.065388	0.017577	-0.082423
0.136119	-0.063881	0.071932	-0.128068
0.287041	-0.012959	0.163452	-0.136548
0.457214	0.057214	0.287807	-0.112193
0.618669	0.118668	0.435388	-0.064612
0.755371	0.155371	0.592883	-0.007117
0.861928	0.161927	0.745048	0.045048
0.938024	0.138024	0.875396	0.075396
0.984225	0.084224	0.966270	0.066270
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

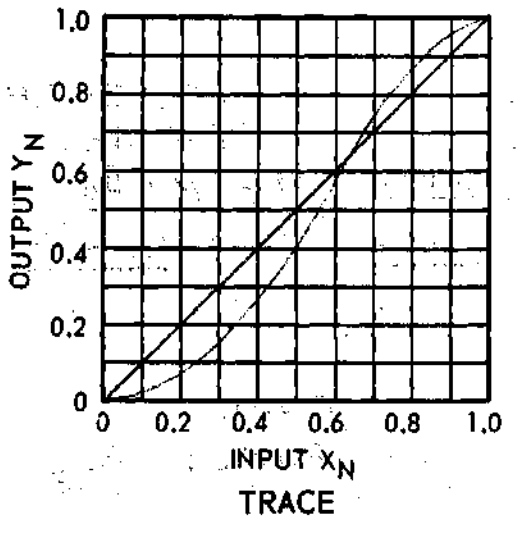


TRACE

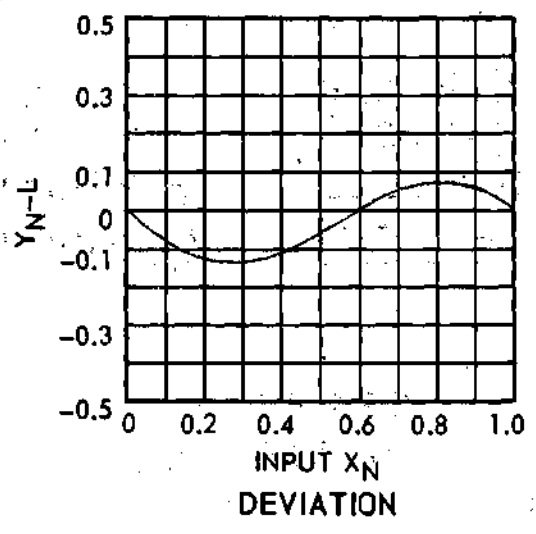


DEVIATION

CRANK RANGE NO1



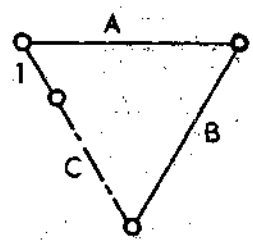
TRACE



DEVIATION

CRANK RANGE NO2

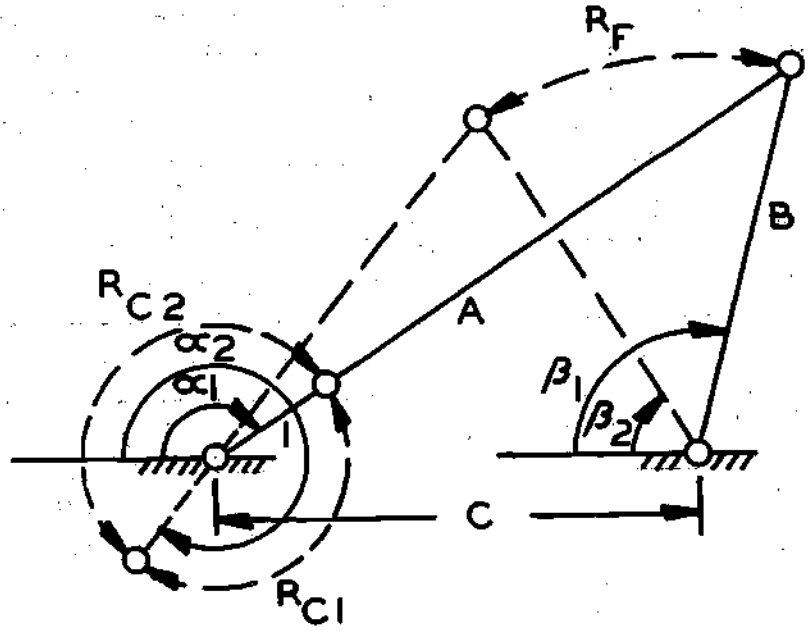
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

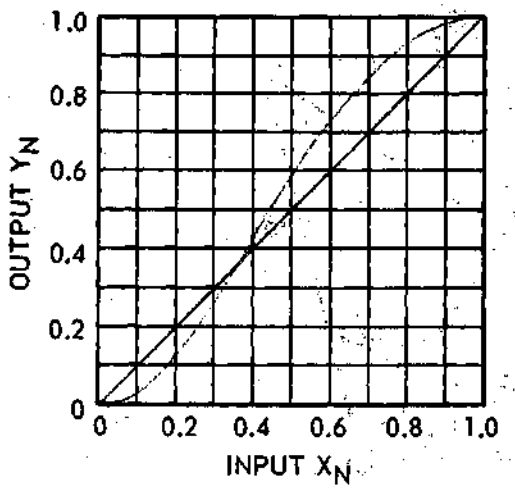
C = 4.0



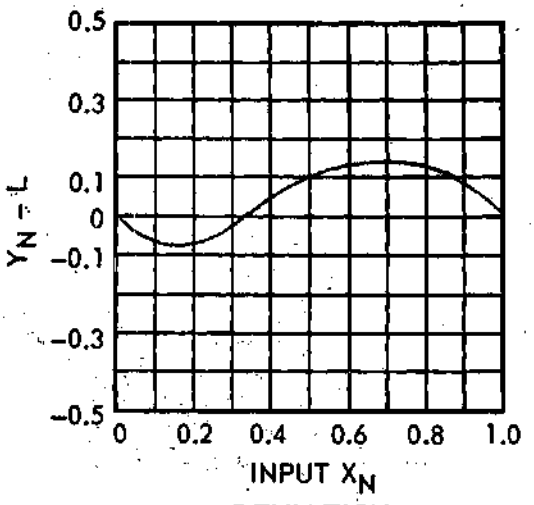
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.293702	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 2.989483	= 0.695842
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035476	-0.064524	0.019221	-0.080779
0.136542	-0.063458	0.080831	-0.119169
0.282670	-0.017330	0.184803	-0.115197
0.444946	0.044946	0.321513	-0.078487
0.599548	0.099548	0.475746	-0.024254
0.733714	0.133714	0.631853	0.031853
0.842930	0.142930	0.775477	0.075477
0.925779	0.125779	0.893133	0.093133
0.979996	0.079996	0.971820	0.071820
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

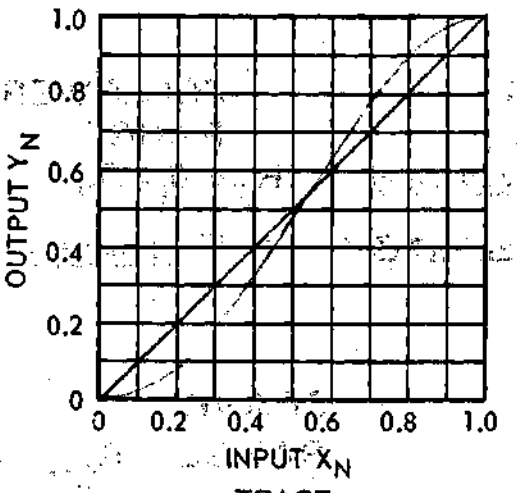


TRACE

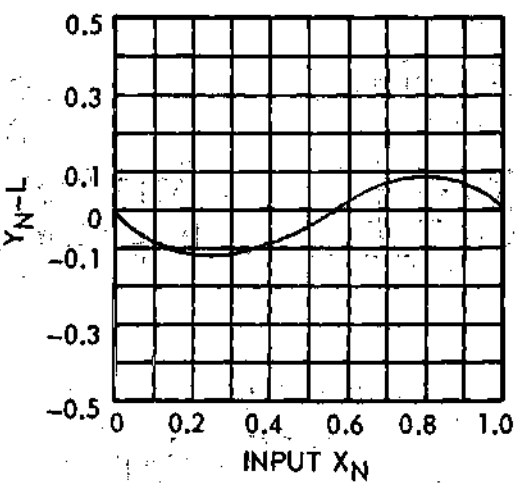


DEVIATION

CRANK RANGE RC1



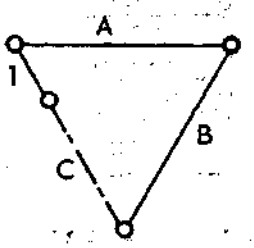
TRACE



DEVIATION

CRANK RANGE RC2

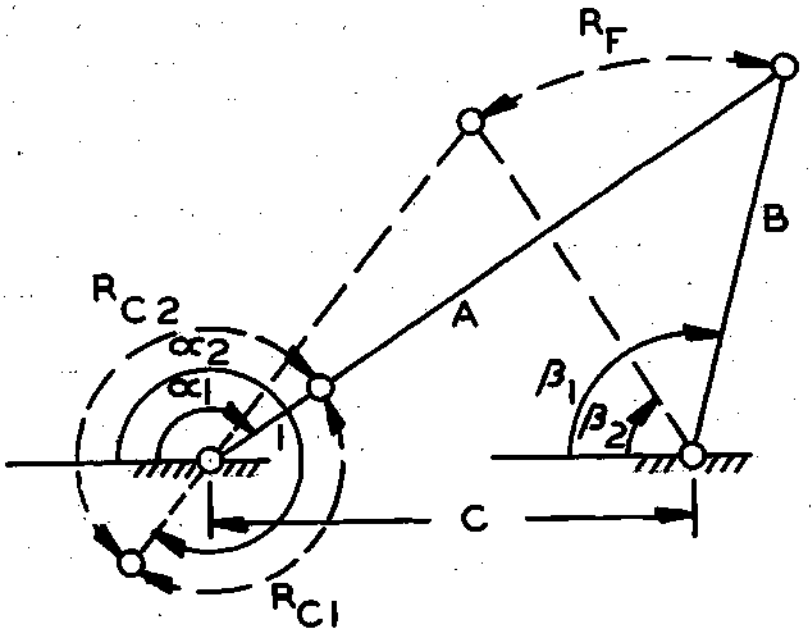
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.0

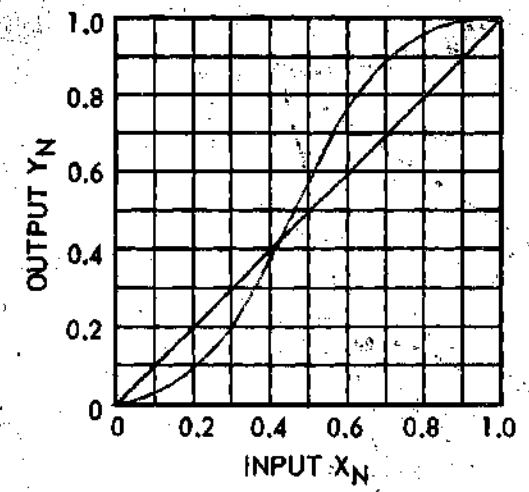
C = 4.5



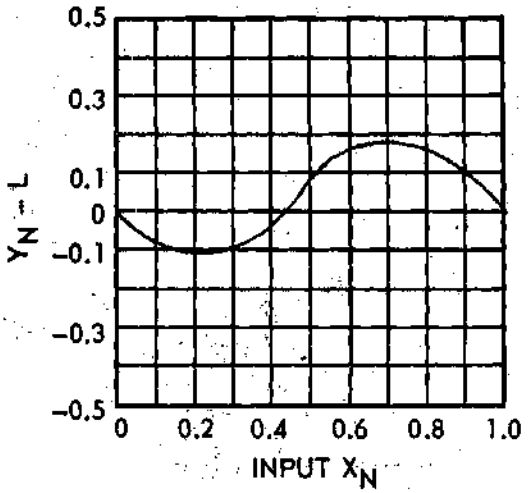
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.075869	$R_F = \beta_1 - \beta_2$
B = 3.5		= 1.047578
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 4.207316	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.017681	-0.082319	0.026675	-0.073325
0.079524	-0.120476	0.090420	-0.109580
0.197991	-0.102009	0.179186	-0.120814
0.374229	-0.025771	0.288075	-0.111925
0.579537	0.079537	0.413875	-0.086125
0.760851	0.160851	0.552443	-0.047557
0.885510	0.185510	0.696924	-0.003076
0.956892	0.156892	0.835779	0.035779
0.990746	0.090746	0.949087	0.049087
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

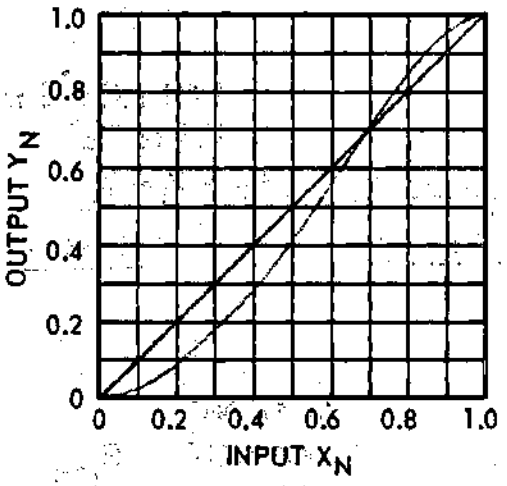


TRACE

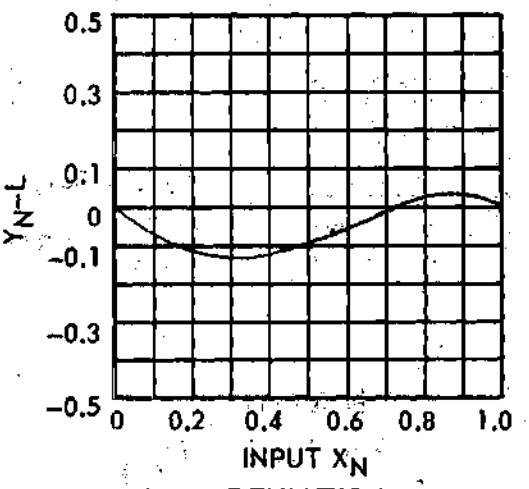


DEVIATION

CRANK RANGE RC1



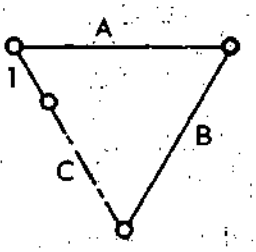
TRACE



DEVIATION

CRANK RANGE RC2

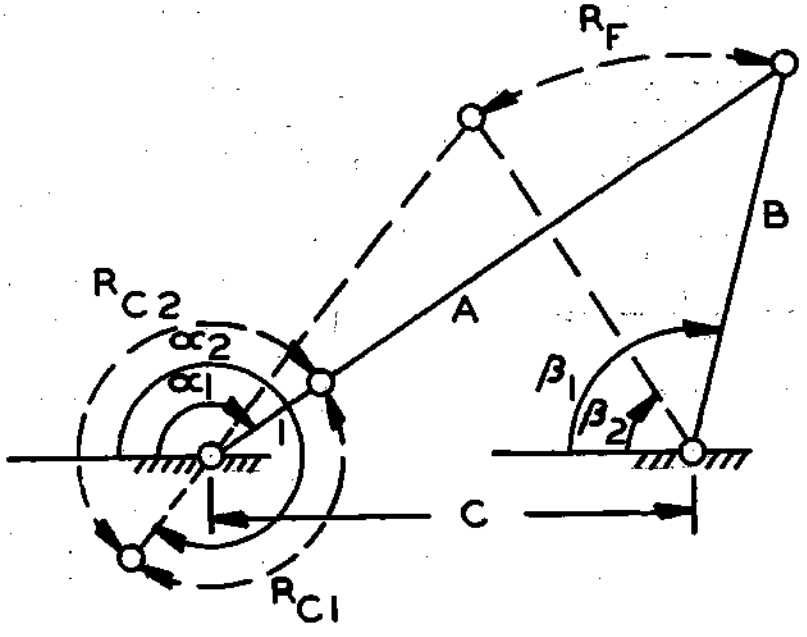
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

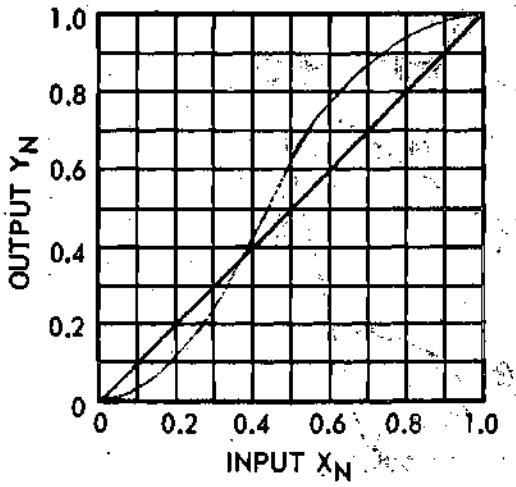
C = 2.0



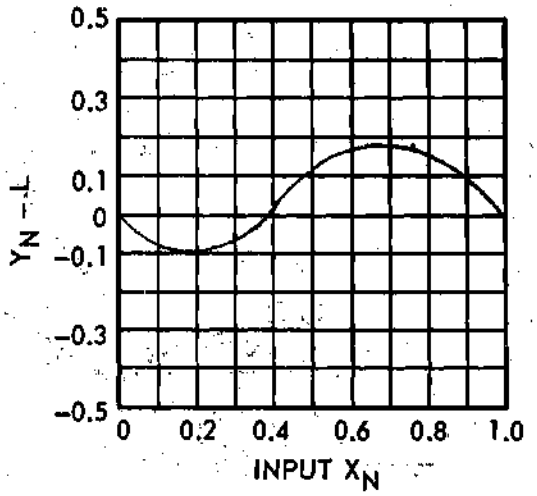
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.416636	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.866549	= 0.833204
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.023782	-0.076218	0.021709	-0.078291
0.102907	-0.097093	0.079118	-0.120882
0.241818	-0.058182	0.165198	-0.134802
0.424988	0.024988	0.275752	-0.124248
0.614597	0.114597	0.406628	-0.093372
0.772993	0.172993	0.551814	-0.048186
0.884940	0.184940	0.701994	0.001994
0.954015	0.154015	0.843016	0.043016
0.989585	0.089585	0.953370	0.053370
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

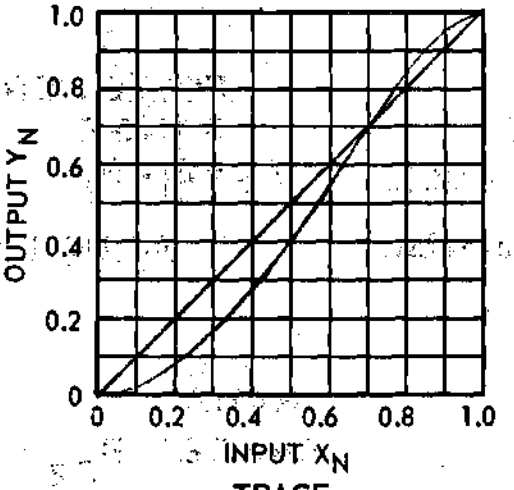


TRACE

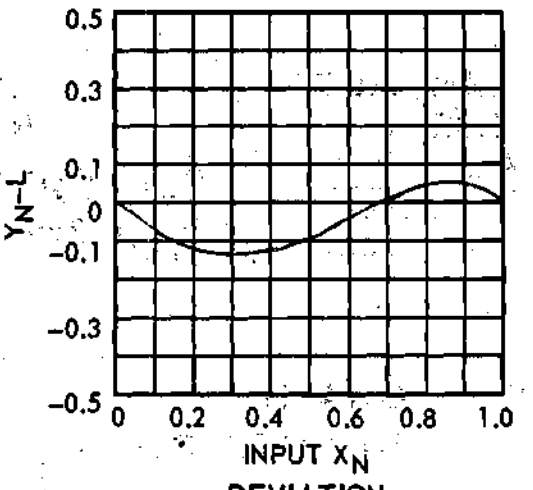


DEVIATION

CRANK RANGE RC1



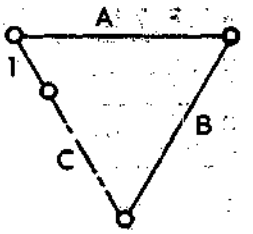
TRACE



DEVIATION

CRANK RANGE RC2

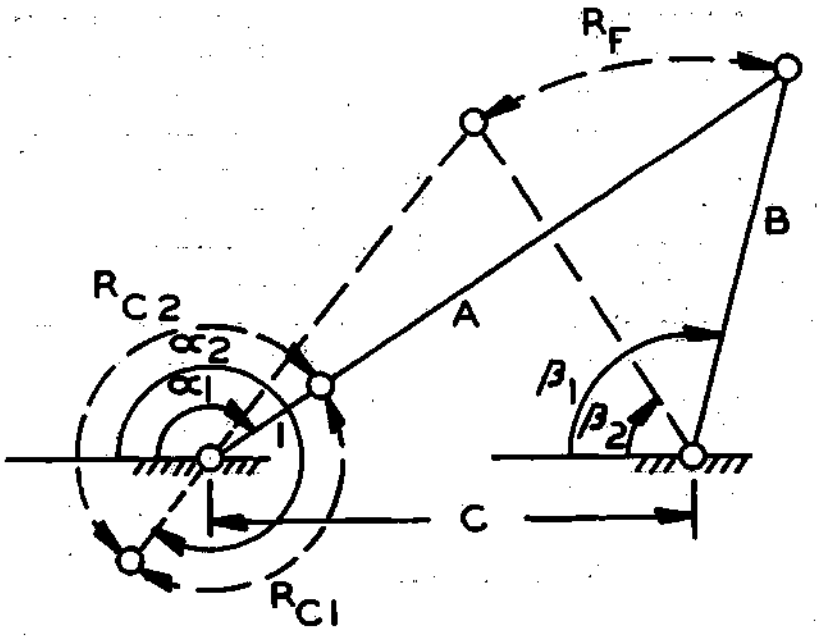
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

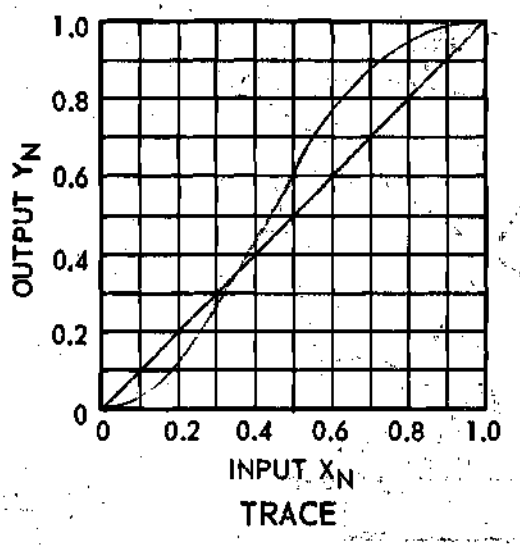
C = 2.5



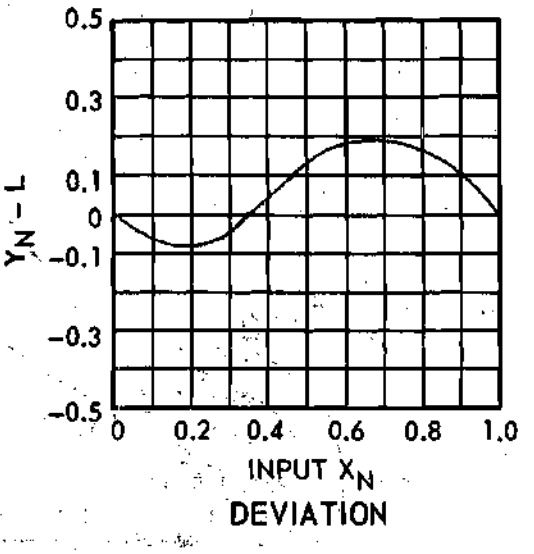
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.644058	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.639127	= 0.711231
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027756	-0.072244	0.019413	-0.080587
0.116234	-0.083766	0.073698	-0.126302
0.262368	-0.037632	0.158776	-0.141224
0.443092	0.043092	0.271198	-0.128802
0.622400	0.122400	0.406158	-0.093842
0.771650	0.171650	0.556040	-0.043960
0.880299	0.180299	0.709462	0.009462
0.950471	0.150471	0.850412	0.050412
0.988407	0.088407	0.956963	0.056963
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

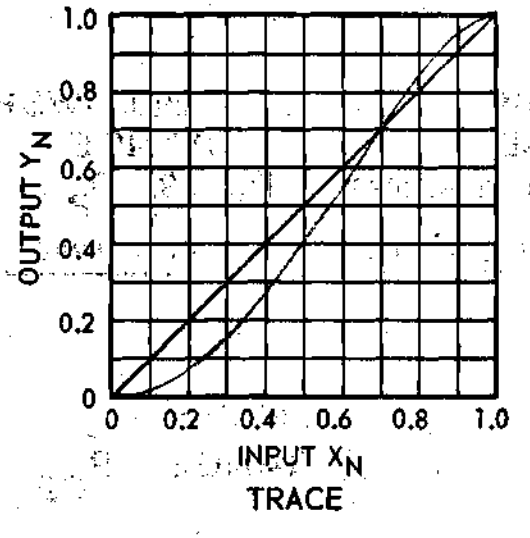


TRACE

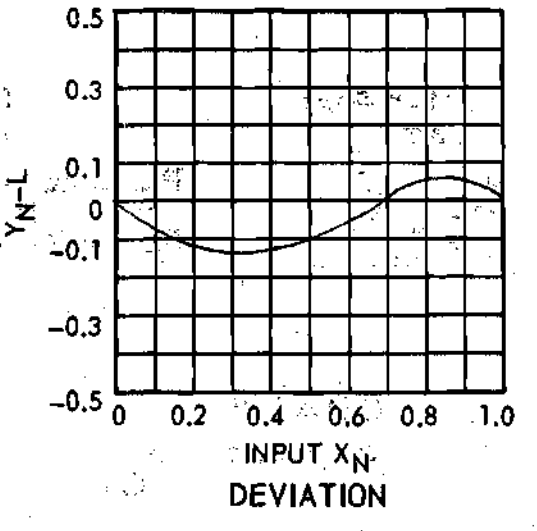


DEVIATION

CRANK RANGE RC1



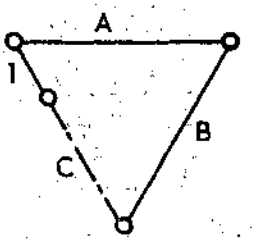
TRACE



DEVIATION

CRANK RANGE RC2

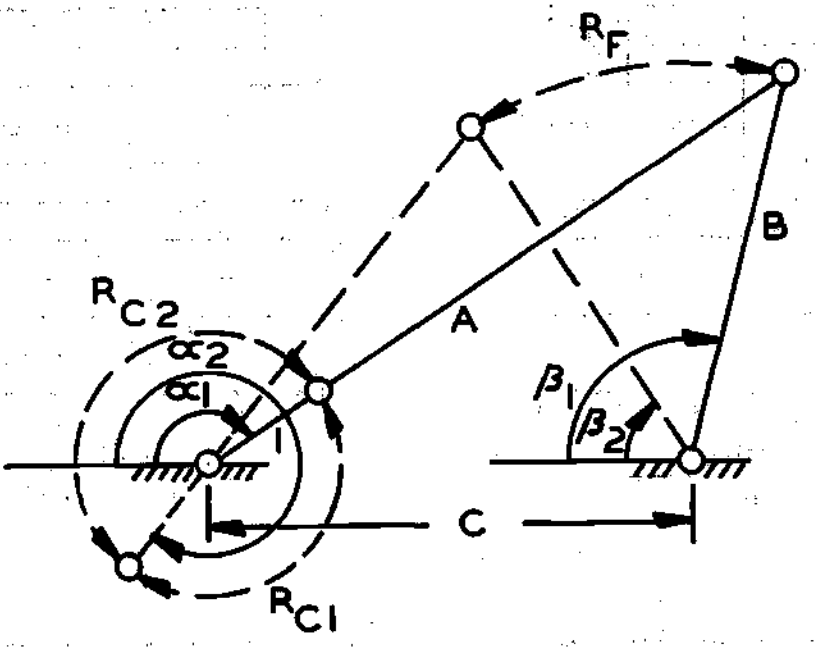
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

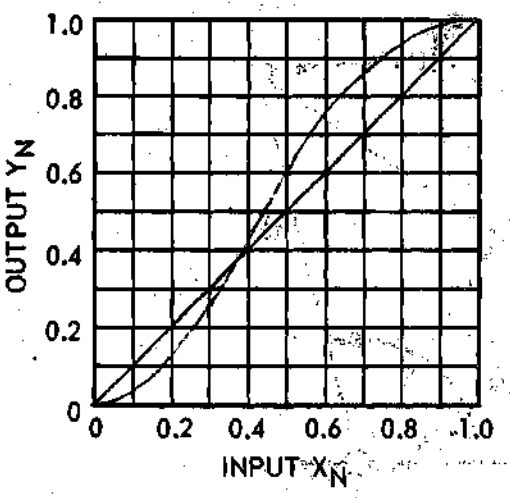
C = 3.0



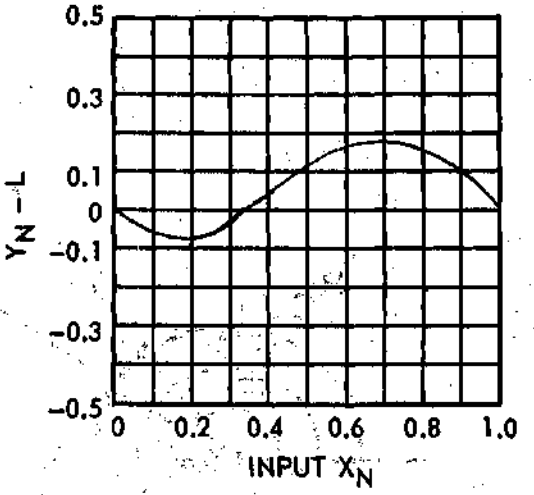
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.823099	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.460086	= 0.636988
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.030611	-0.069389	0.018132	-0.081868
0.124807	-0.075193	0.070896	-0.129104
0.273640	-0.026360	0.156281	-0.143719
0.450602	0.050602	0.271310	-0.128690
0.622770	0.122770	0.410328	-0.089672
0.766919	-0.166919	0.564006	-0.035994
0.874576	0.174576	0.719082	0.019082
0.946649	0.146649	0.858318	0.058318
0.987167	0.087167	0.960300	0.060300
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

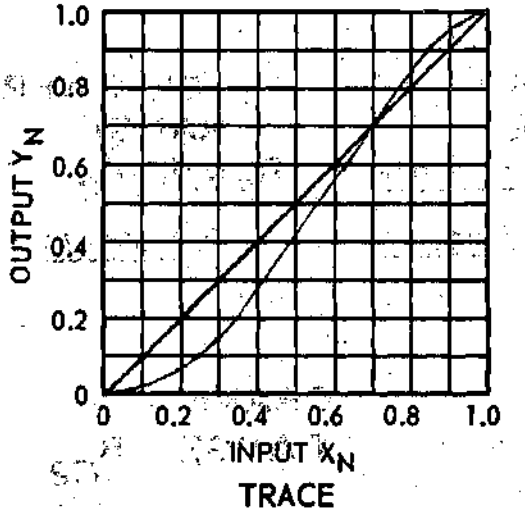


TRACE

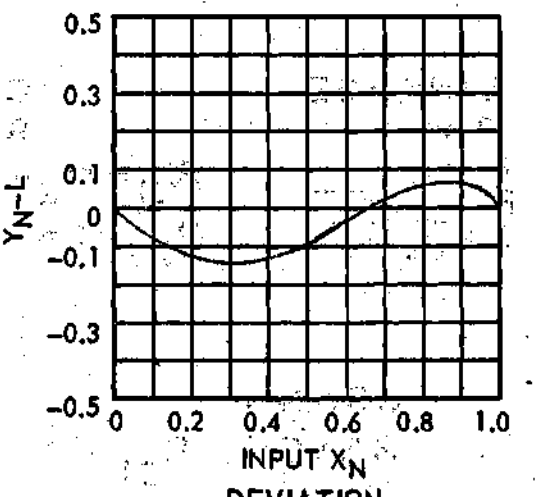


DEVIATION

CRANK RANGE RC1



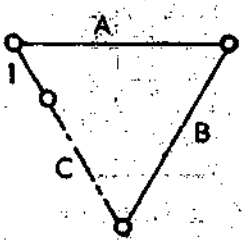
TRACE



DEVIATION

CRANK RANGE RC2

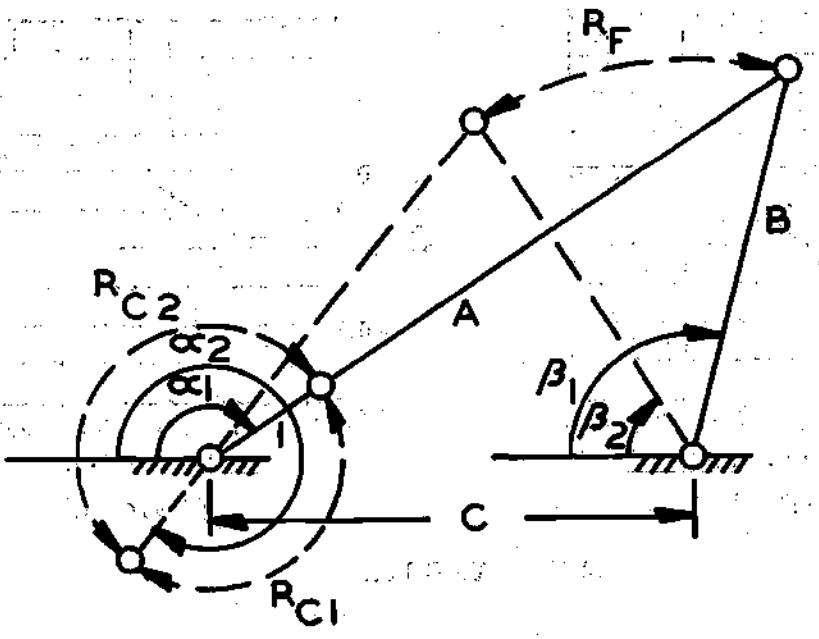
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

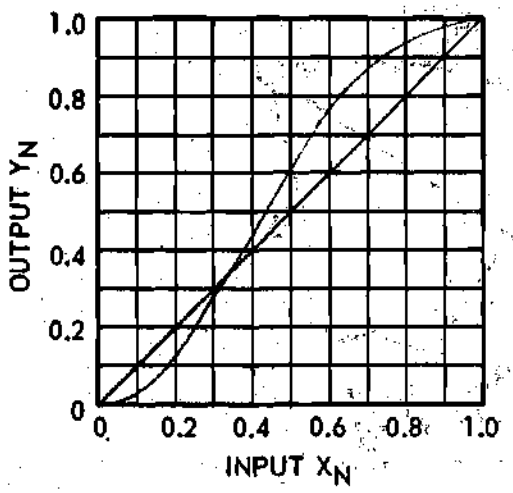
C = 3.5

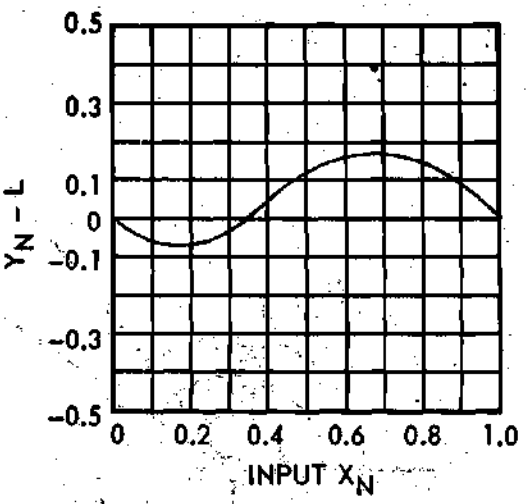


LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.982078	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.301107	= 0.594473
C = 4.0		

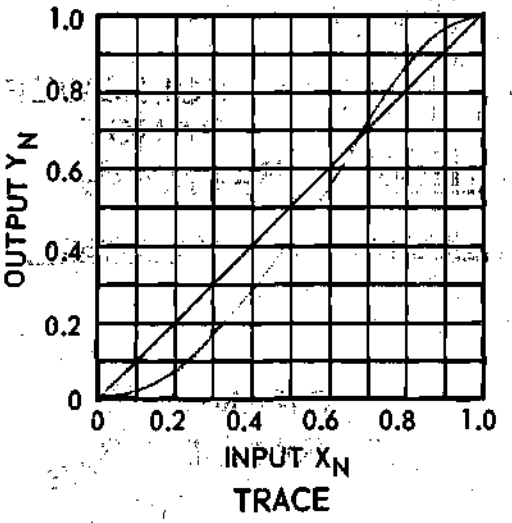
CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032759	-0.067241	0.017470	-0.082530
0.130557	-0.069443	0.070038	-0.129962
0.279826	-0.020174	0.157295	-0.142705
0.452583	0.052583	0.276268	-0.123732
0.619021	0.119021	0.419867	-0.080133
0.759734	0.159734	0.576688	-0.023312
0.867472	0.167472	0.731779	0.031779
0.942096	0.142096	0.867430	0.067430
0.985684	0.085684	0.963723	0.063723
1.000000	0.000000	1.000000	0.000000

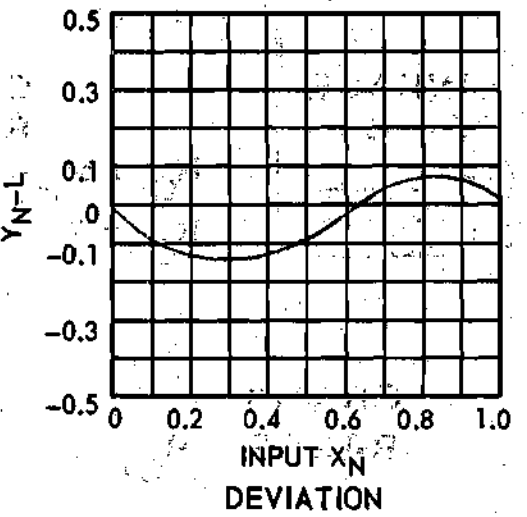
All angles measured in radians.





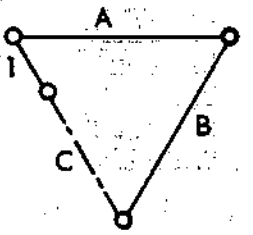
CRANK RANGE RC1





CRANK RANGE RC2

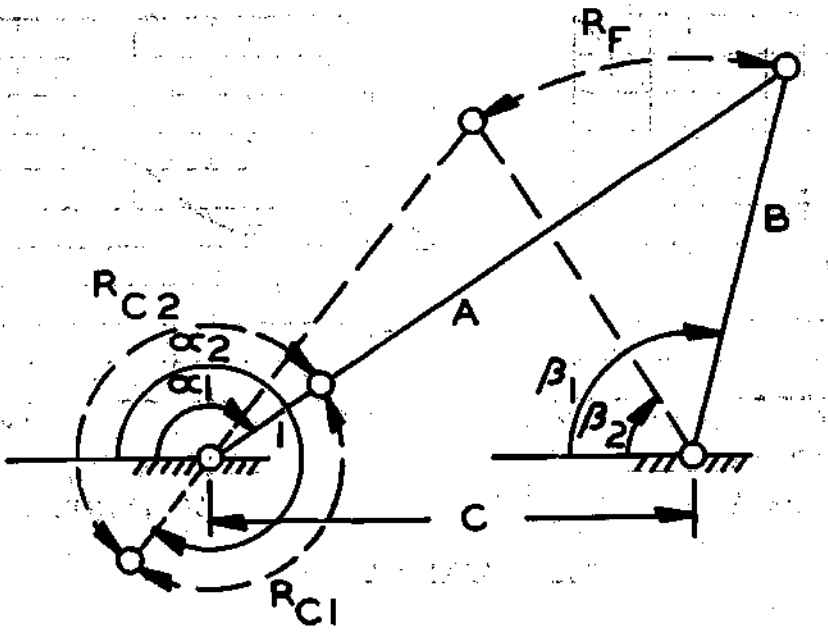
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

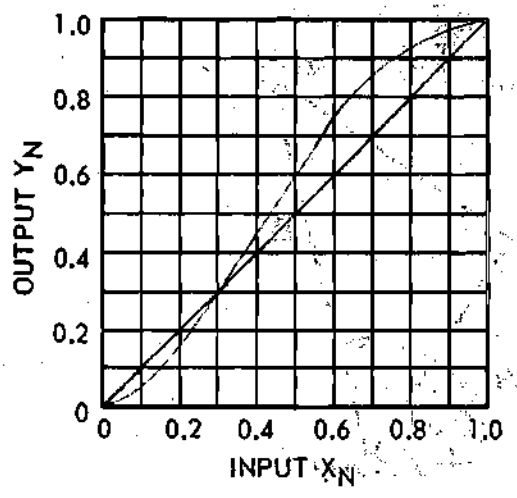
C = 4.0



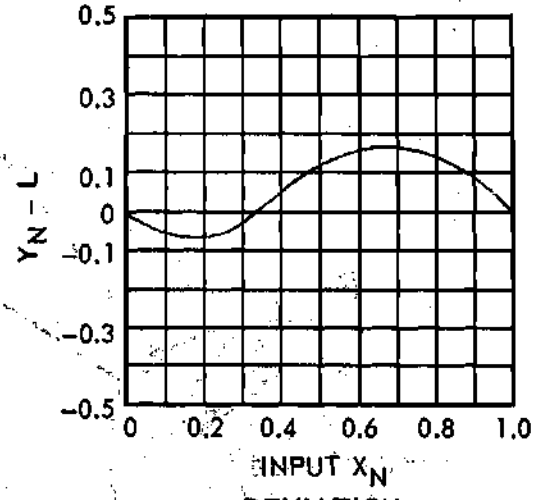
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.141593	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 4.5	$R_{C2} = 2\pi - R_{C1} =$ 3.141593	= 0.579503

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034348	-0.065652	0.017466	-0.082534
0.134110	-0.065890	0.071758	-0.128242
0.282011	-0.017989	0.163697	-0.136303
0.449775	0.049775	0.289209	-0.110791
0.610763	0.110763	0.438450	-0.061550
0.748744	0.148744	0.597373	-0.002627
0.857429	0.157429	0.749872	0.049872
0.935701	0.135701	0.879002	0.079002
0.983560	0.083560	0.967637	0.067637
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

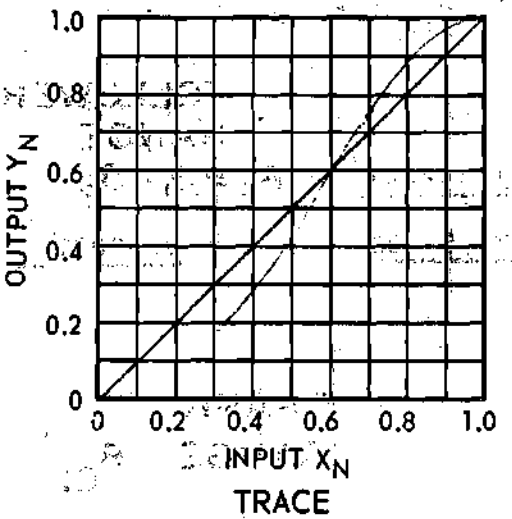


TRACE

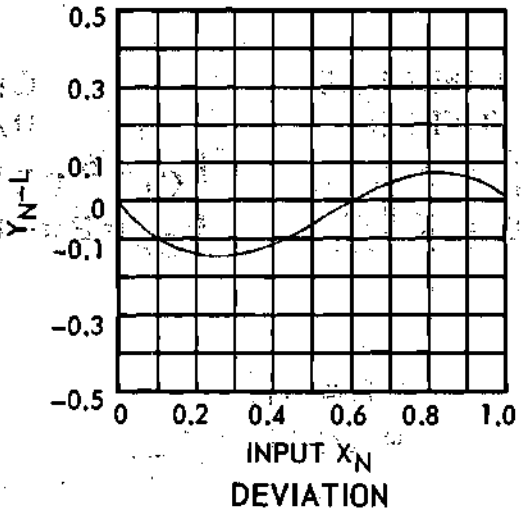


DEVIATION

CRANK RANGE RC1



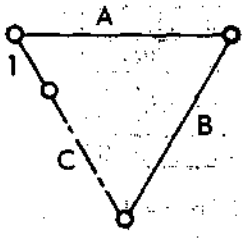
TRACE



DEVIATION

CRANK RANGE RC2

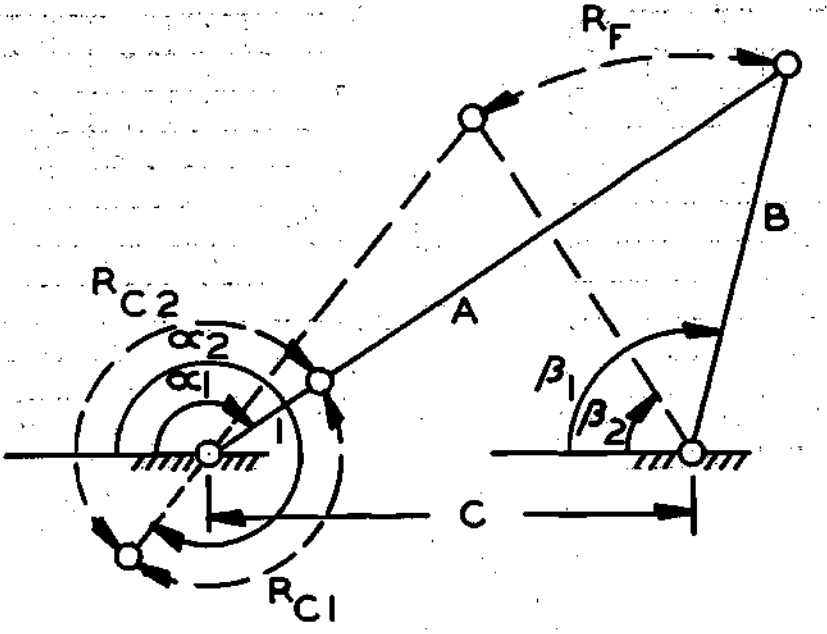
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

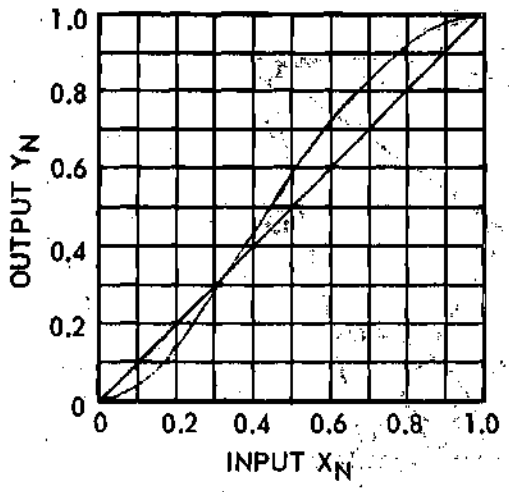
C = 4.5



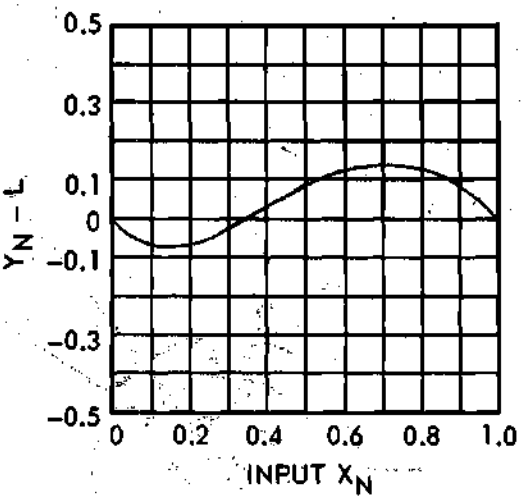
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.332282	$R_F = \beta_1 - \beta_2$
B = 3.5		= 0.600776
C = 5.0	$R_{C2} = 2\pi - R_{C1} =$ 2.950903	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035278	-0.064722	0.019049	-0.080951
0.135001	-0.064999	0.080483	-0.119517
0.278900	-0.021100	0.184903	-0.115097
0.439441	0.039441	0.322915	-0.077085
0.593646	0.093646	0.478792	-0.021208
0.728608	0.128608	0.636040	0.036040
0.839278	0.139278	0.779652	0.079652
0.923751	0.123751	0.896035	0.096035
0.979359	0.079359	0.972847	0.072847
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

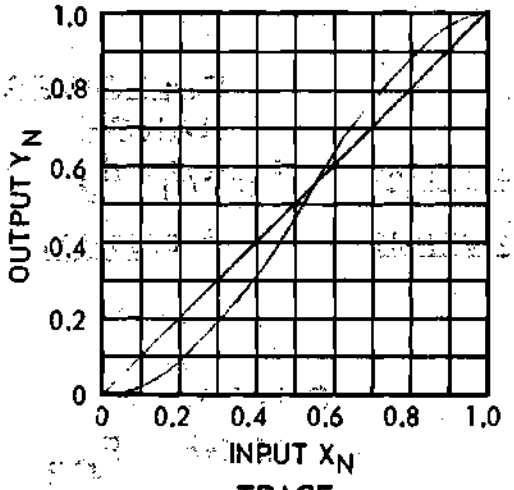


TRACE

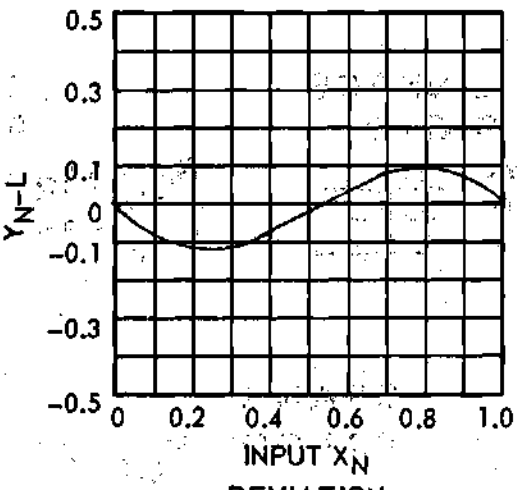


DEVIATION

CRANK RANGE RG1



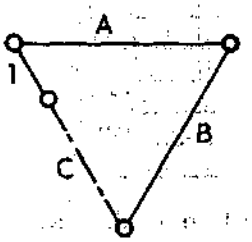
TRACE



DEVIATION

CRANK RANGE RG2

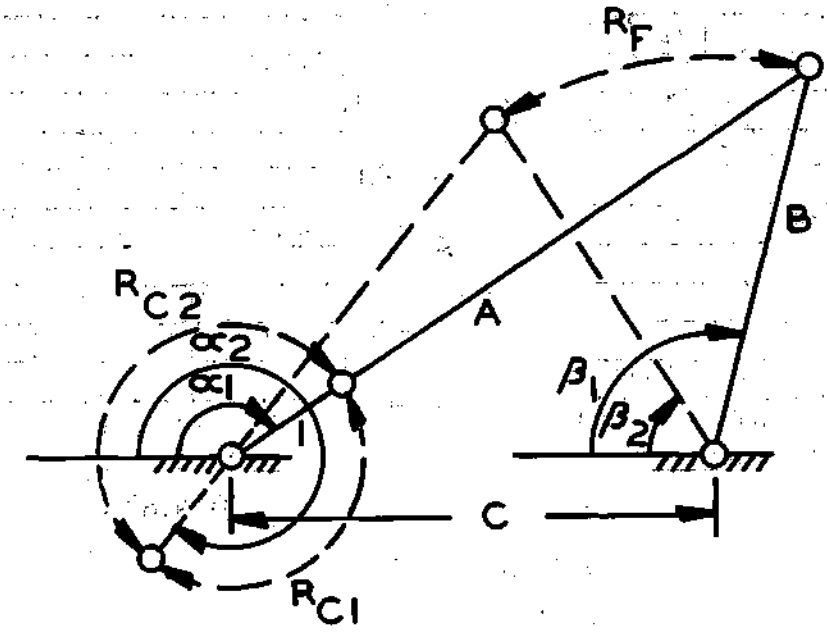
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 3.5

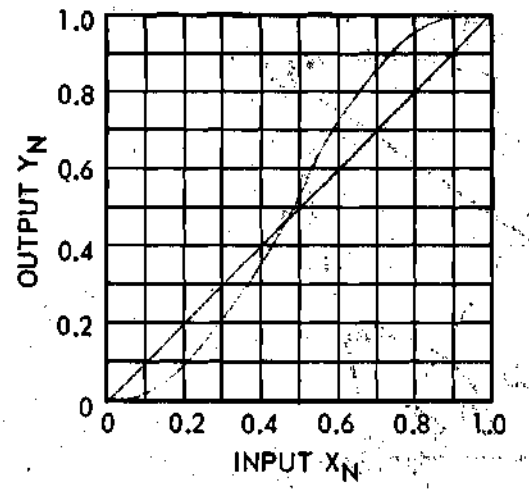
C = 5.0



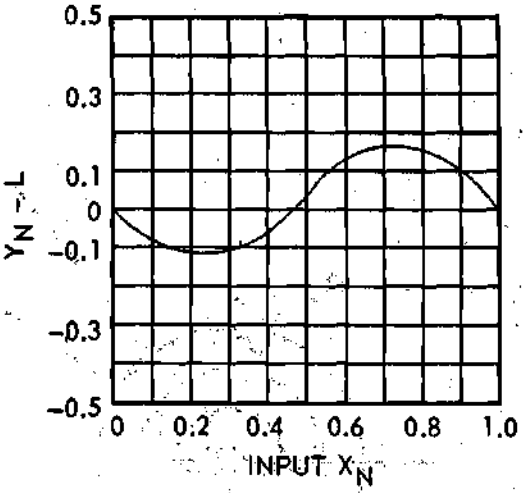
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.211165	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 4.072020	= 0.831531
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.018207	-0.081793	0.026560	-0.073440
0.079723	-0.120277	0.090917	-0.109083
0.193000	-0.107000	0.181196	-0.118804
0.357180	-0.042820	0.292297	-0.107703
0.550969	0.050969	0.420693	-0.079307
0.732914	0.132914	0.561670	-0.038330
0.867909	0.167909	0.707365	0.007365
0.949425	0.149425	0.844868	0.044868
0.989068	0.089068	0.953481	0.053481
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

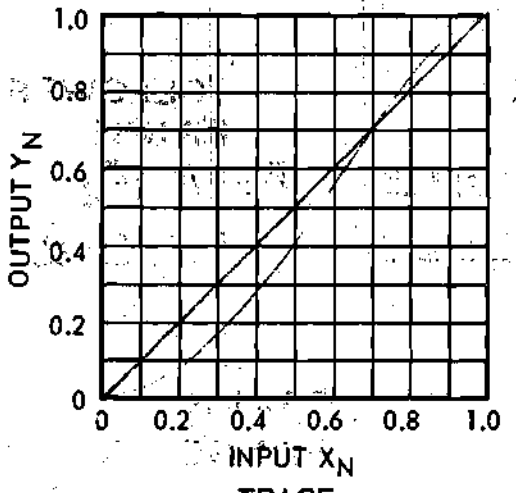


TRACE

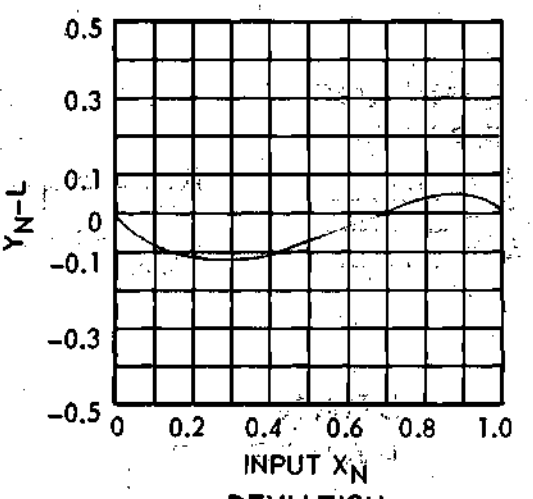


DEVIATION

GRASH RANGE NO1



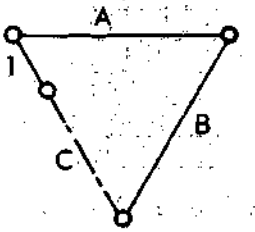
TRACE



DEVIATION

GRASH RANGE NO2

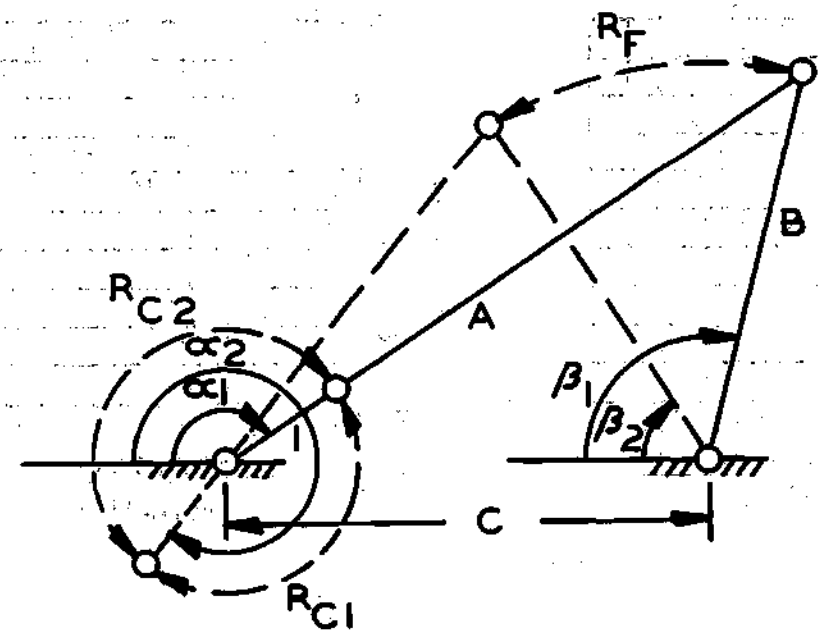
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

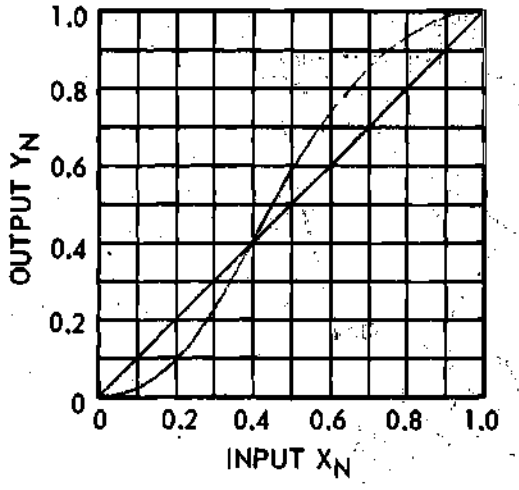
C = 2.5



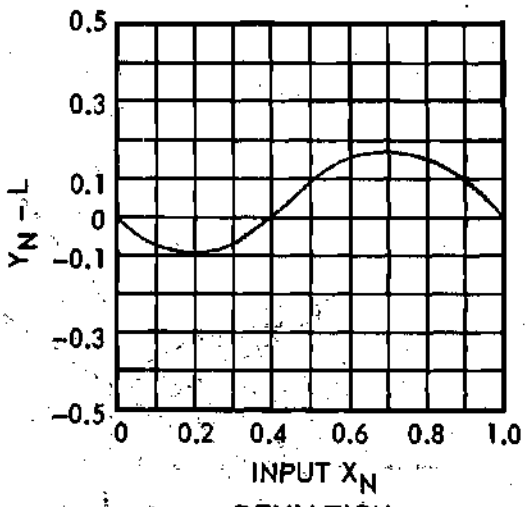
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.504515	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.778670	= 0.681039
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.023912	-0.076088	0.021603	-0.078397
0.101601	-0.098399	0.079251	-0.120749
0.235205	-0.064795	0.166221	-0.133779
0.410732	0.010732	0.278331	-0.121669
0.596271	0.096271	0.411221	-0.088779
0.757133	0.157133	0.558354	-0.041646
0.874984	0.174984	0.709493	0.009493
0.949545	0.149545	0.849403	0.049403
0.988504	0.088504	0.956277	0.056277
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

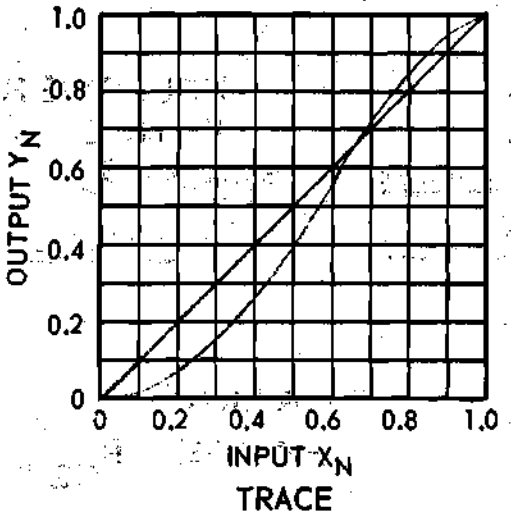


TRACE

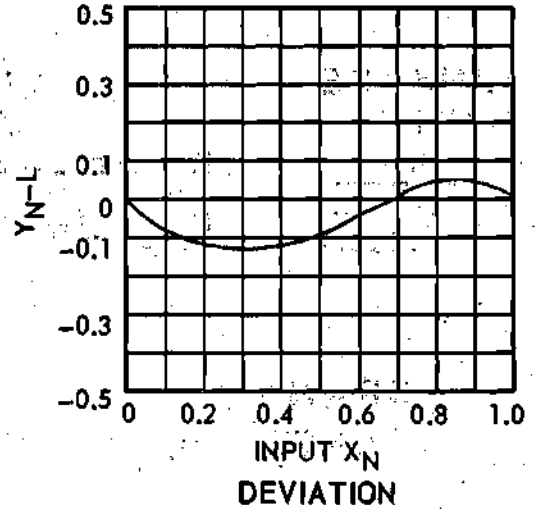


DEVIATION

CRANK RANGE RC1



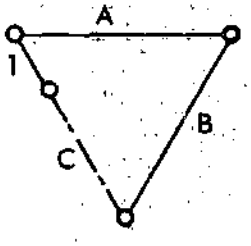
TRACE



DEVIATION

CRANK RANGE RC2

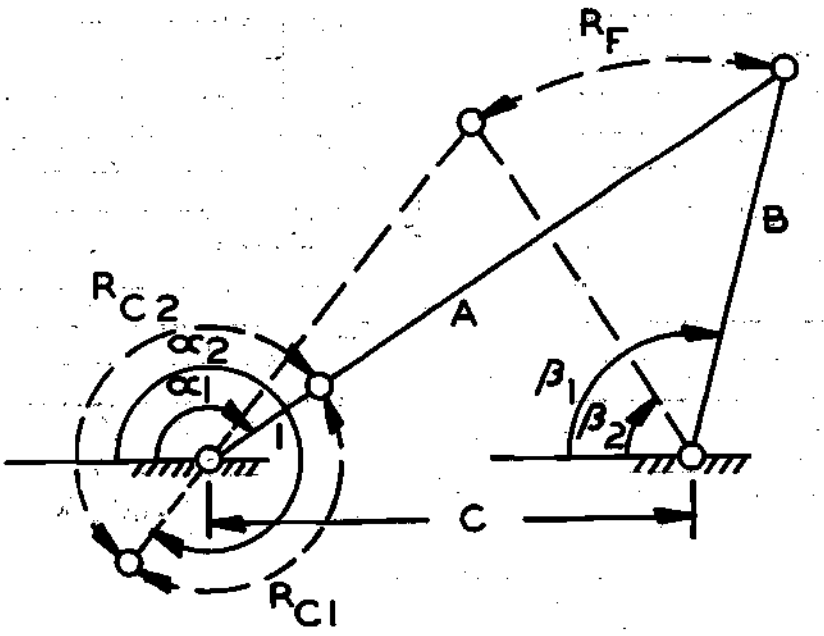
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

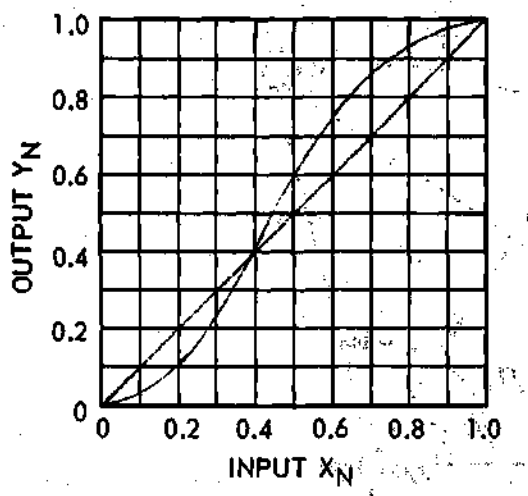
C = 3.0



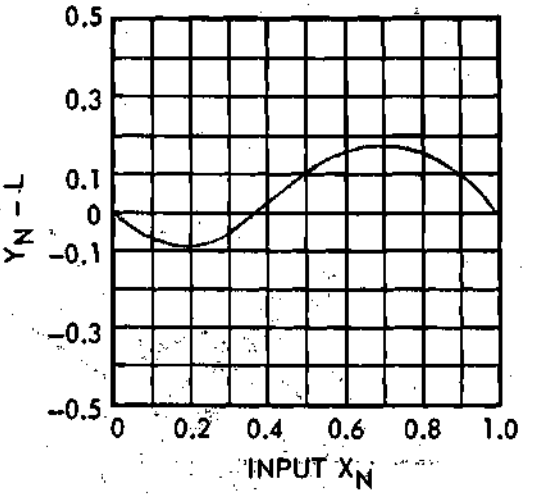
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.706634	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.594473
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.576551	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027734	-0.072266	0.019317	-0.080683
0.114698	-0.085302	0.073683	-0.126317
0.256699	-0.043301	0.159331	-0.140669
0.432643	0.032643	0.272913	-0.127087
0.610065	0.110065	0.409492	-0.090508
0.761207	0.161207	0.560971	-0.039029
0.873604	0.173604	0.715141	0.015141
0.947337	0.147337	0.855139	0.055139
0.987612	0.087612	0.959011	0.059011
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

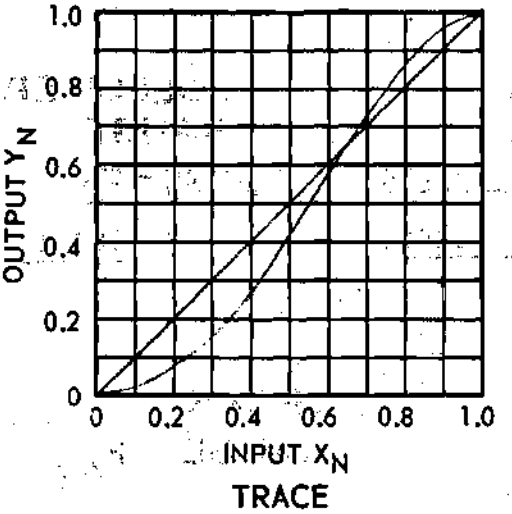


TRACE

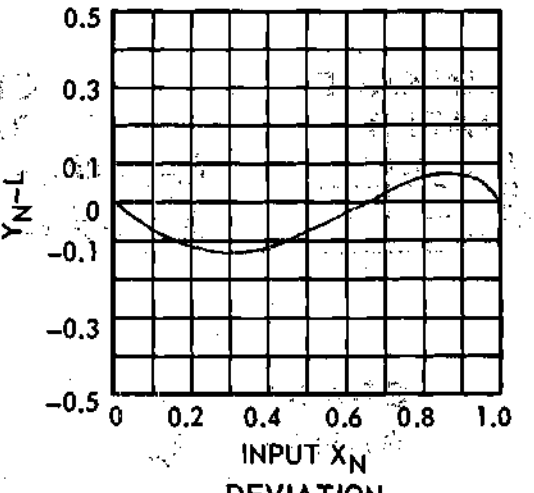


DEVIATION

CRANK RANGE RG1



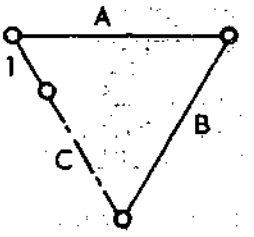
TRACE



DEVIATION

CRANK RANGE RG2

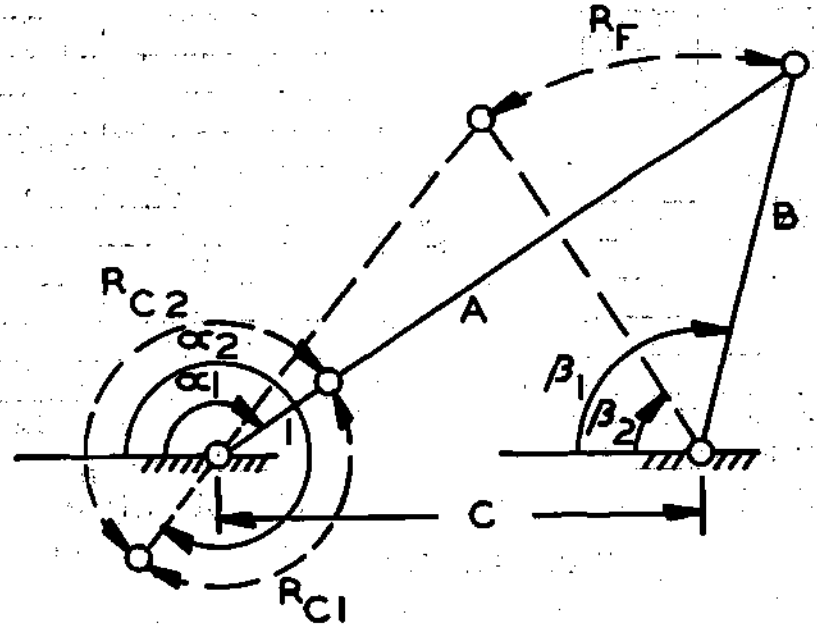
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

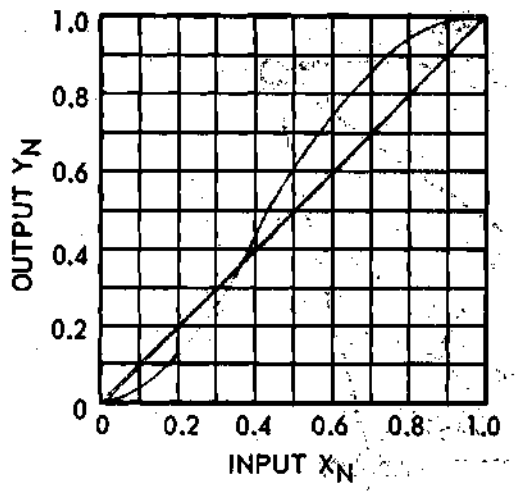
C = 3.5



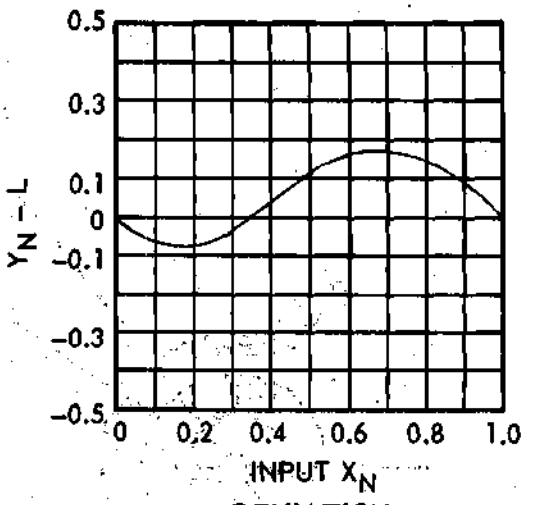
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 = 2.870674$	$R_F = \beta_1 - \beta_2$
B = 4.0		
C = 4.0	$R_{C2} = 2\pi - R_{C1} = 3.412511$	= 0.518371

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.030535	-0.069465	0.018037	-0.081963
0.123380	-0.076620	0.070791	-0.129209
0.269072	-0.030928	0.156552	-0.143448
0.442841	0.042841	0.272496	-0.127504
0.613951	0.113951	0.412876	-0.087124
0.759462	0.159462	0.567905	-0.032095
0.869681	0.169681	0.723568	0.023568
0.944273	0.144273	0.861959	0.061959
0.986538	0.086538	0.961809	0.061809
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

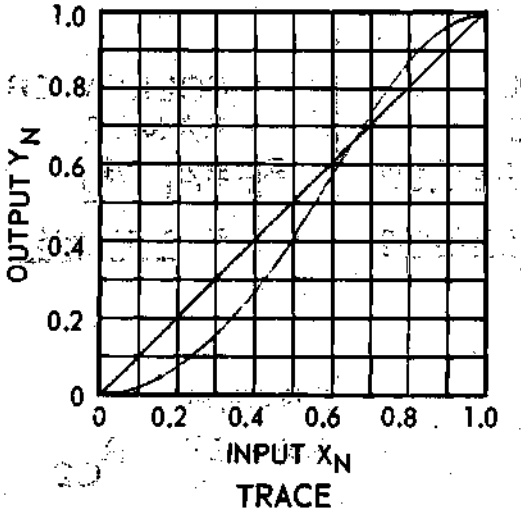


TRACE

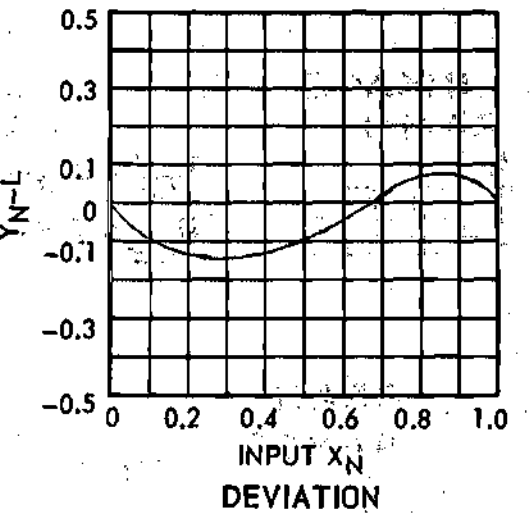


DEVIATION

CRANK RANGE RC1



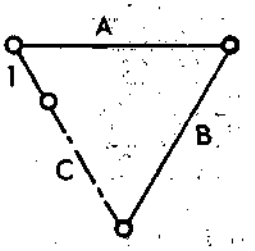
TRACE



DEVIATION

CRANK RANGE RC2

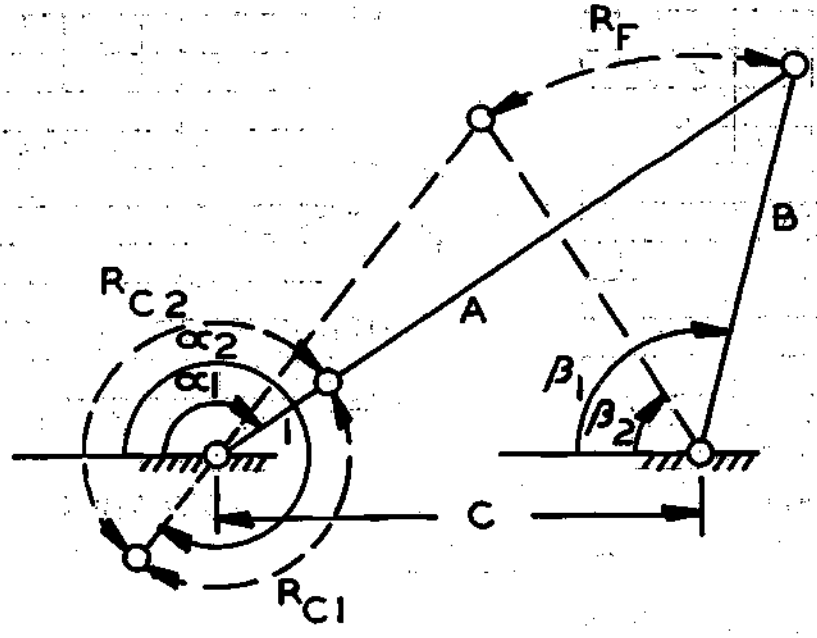
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

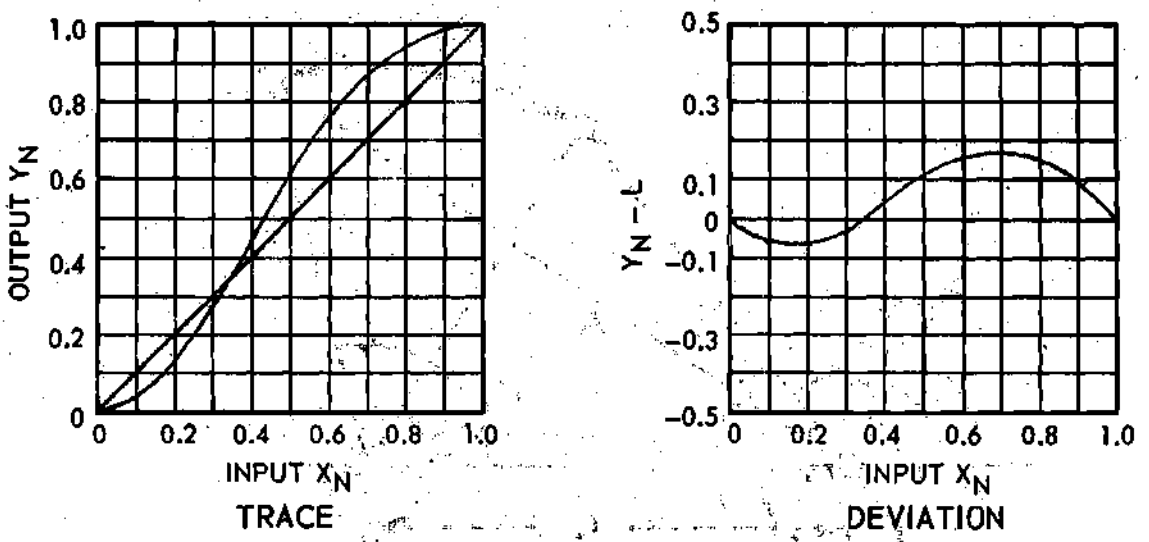
C = 4.0



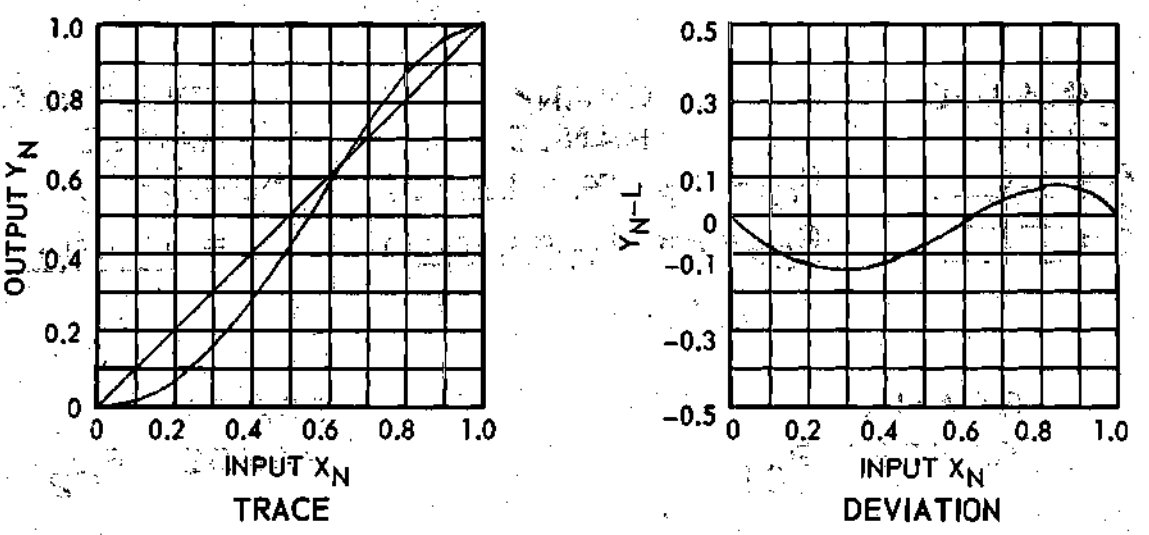
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.020305	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.262880	= 0.512896
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032670	-0.067330	0.017369	-0.082631
0.129319	-0.070681	0.069858	-0.130142
0.276177	-0.023823	0.157365	-0.142635
0.446679	0.046679	0.277111	-0.122889
0.612434	0.112434	0.421923	-0.078077
0.754120	0.154120	0.579925	-0.020075
0.863690	0.163690	0.735466	0.035466
0.940191	0.140191	0.870330	0.070330
0.985159	0.085159	0.964872	0.064872
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

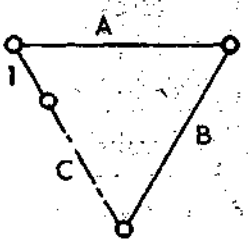


CRANK RANGE RC1



CRANK RANGE RC2

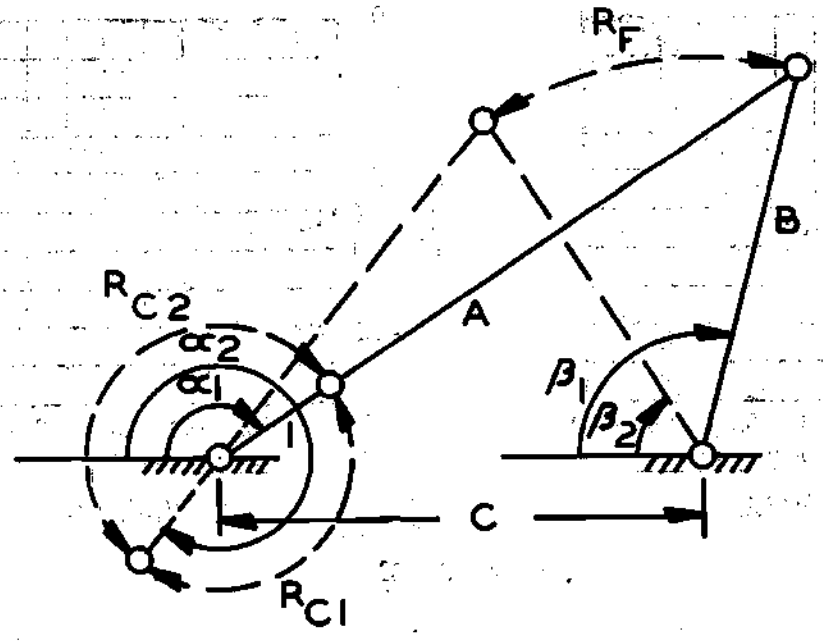
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

C = 4.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 = 3.174045$	$R_F = \beta_1 - \beta_2$
B = 4.0		
C = 5.0	$R_{C2} = 2\pi - R_{C1} = 3.109140$	$= 0.505904$

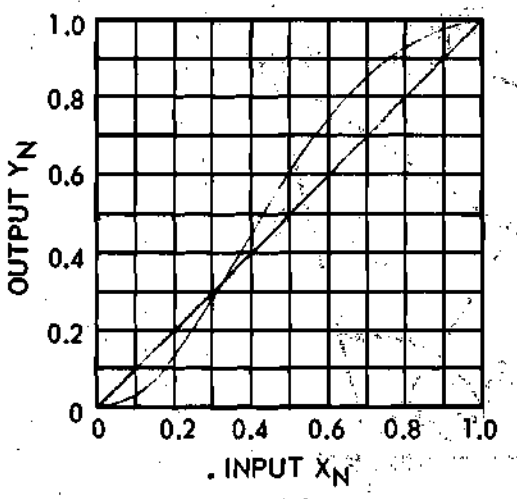
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.034267	-0.065733
0.133069	-0.066931
0.279097	-0.020903
0.445203	0.045203
0.605696	0.105696
0.744358	0.144358
0.854376	0.154376
0.934092	0.134092
0.983091	0.083091
1.000000	0.000000

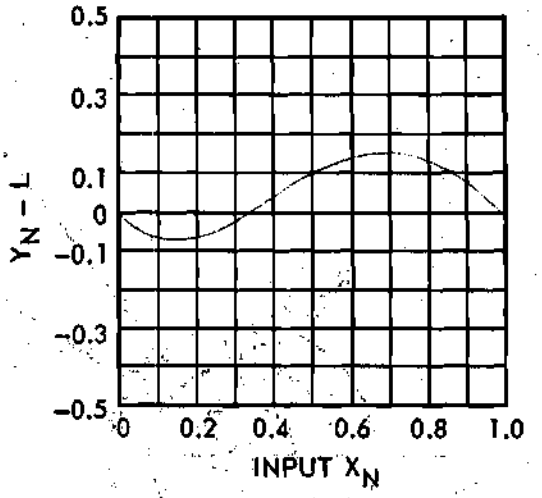
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.017348	-0.082652
0.071495	-0.128505
0.163612	-0.136388
0.289862	-0.110138
0.440267	-0.059733
0.600244	-0.000244
0.753041	0.053041
0.881386	0.081386
0.968535	0.068535
1.000000	0.000000

All angles measured in radians.

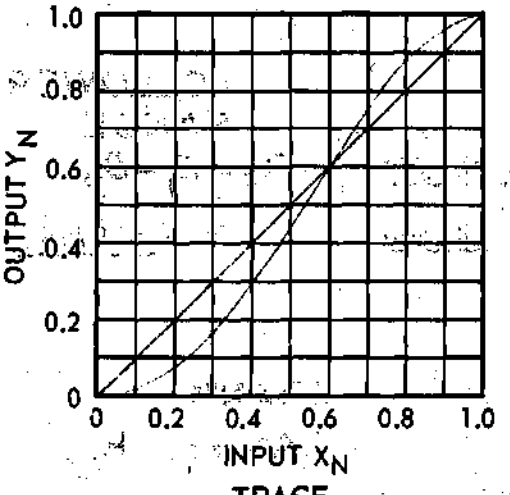


TRACE

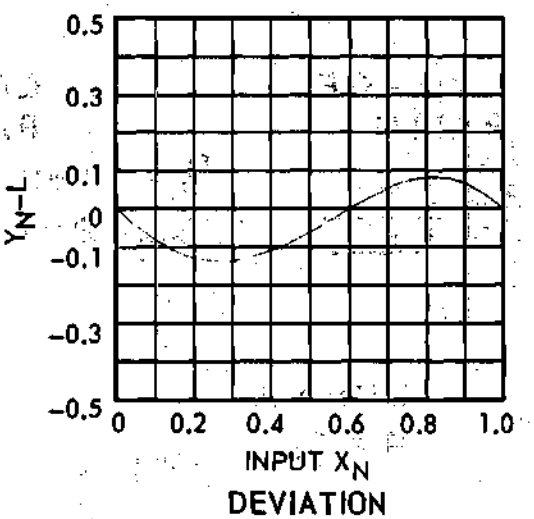


DEVIATION

CRANK RANGE RC1



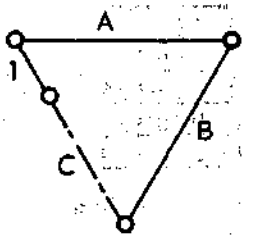
TRACE



DEVIATION

CRANK RANGE RC2

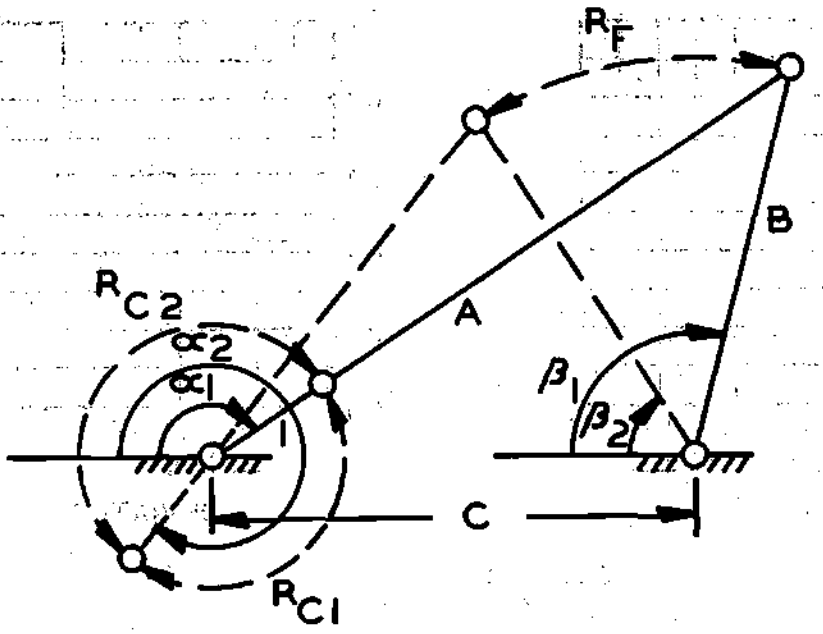
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

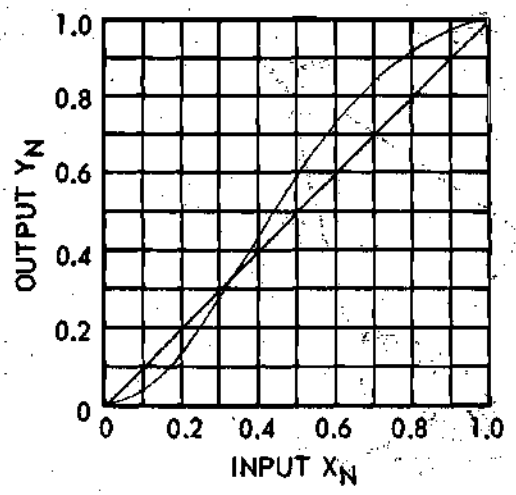
C = 5.0



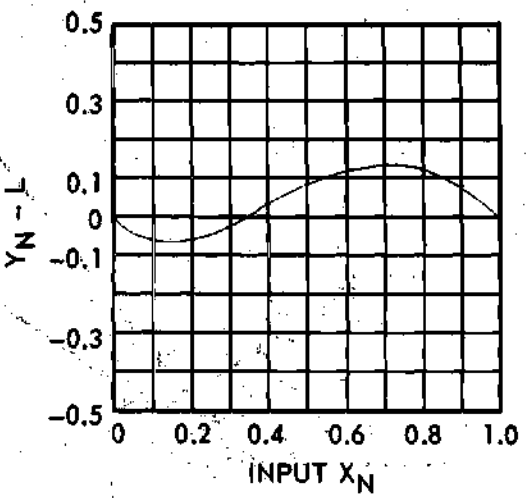
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.361845	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 2.921340	= 0.529774
C = 5.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035217	-0.064783	0.018888	-0.081112
0.134158	-0.065842	0.080097	-0.119903
0.276601	-0.023399	0.184749	-0.115251
0.435899	0.035899	0.323677	-0.076323
0.589710	0.089710	0.480782	-0.019218
0.725110	0.125110	0.638913	0.038913
0.836721	0.136721	0.782561	0.082561
0.922304	0.122304	0.898058	0.098058
0.978895	0.078895	0.973559	0.073559
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

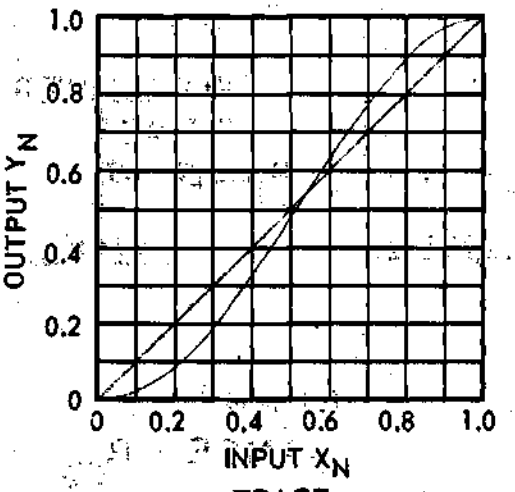


TRACE

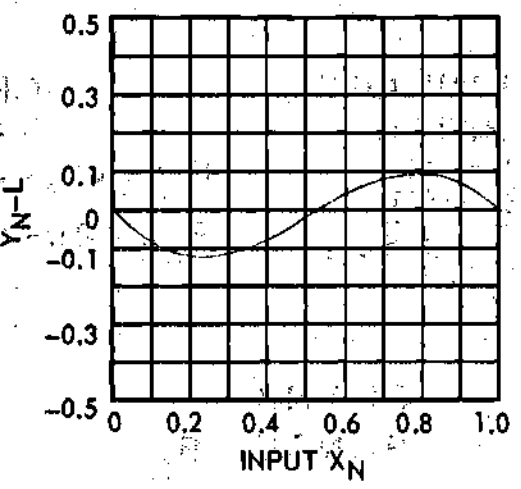


DEVIATION

CRANK RANGE RC1



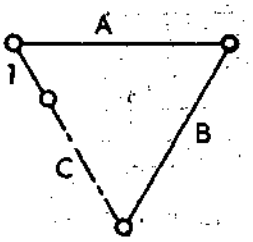
TRACE



DEVIATION

CRANK RANGE RC2

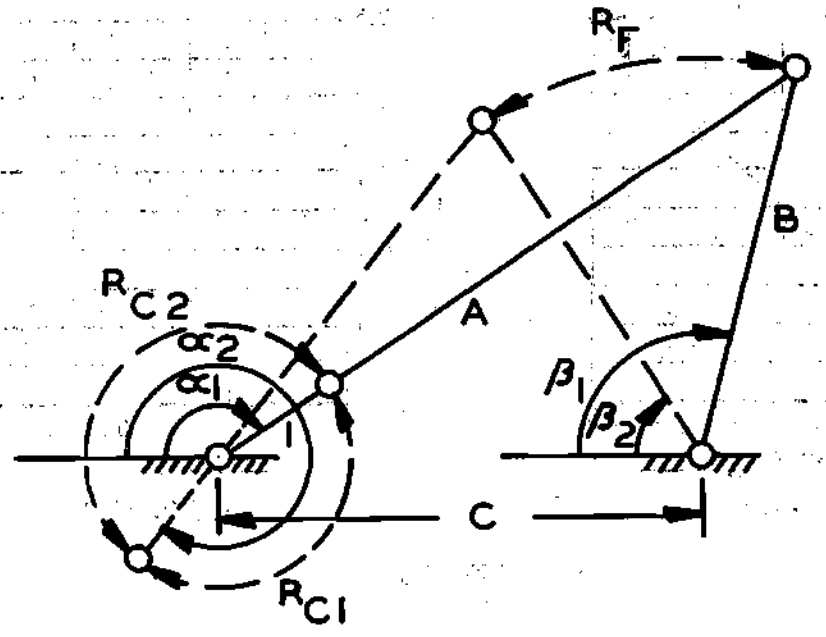
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.0

B = 4.0

C = 5.5



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.043999	$R_F = \beta_1 - \beta_2$
B = 1.5		
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.239186	= 1.483366

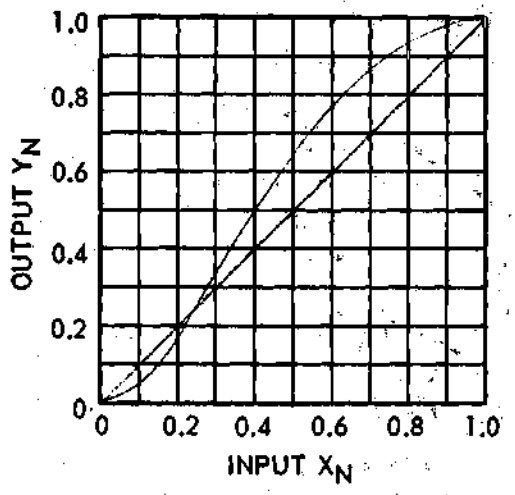
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.043781	-0.056219
0.169170	-0.030830
0.337137	0.037137
0.505044	0.105044
0.651884	0.151884
0.772543	0.172543
0.867714	0.167714
0.938430	0.138430
0.983739	0.083739
1.000000	0.000000

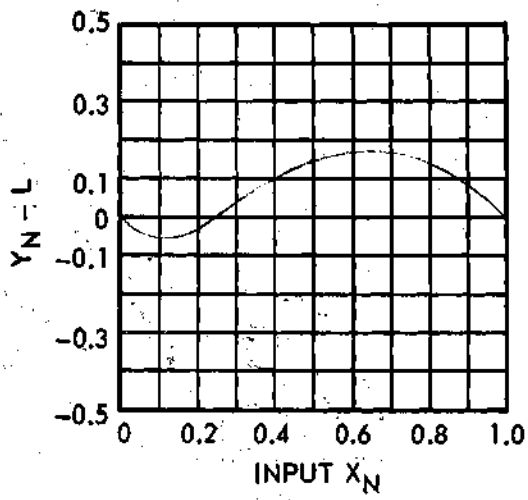
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.020294	-0.079706
0.082153	-0.117847
0.180644	-0.119356
0.305149	-0.094851
0.444656	-0.055344
0.589839	-0.010161
0.732045	0.032045
0.860719	0.060719
0.959260	0.059260
1.000000	0.000000

All angles measured in radians.

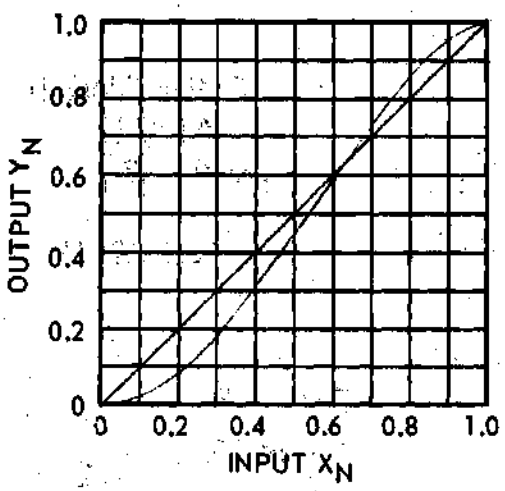


TRACE

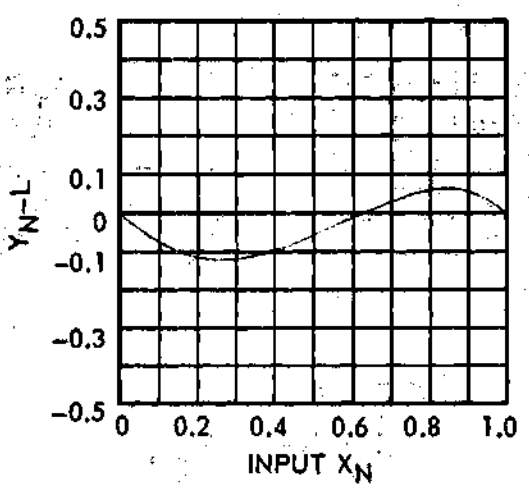


DEVIATION

CRANK RANGE RC1



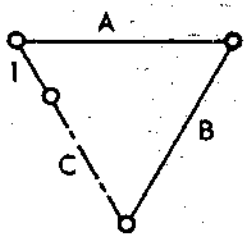
TRACE



DEVIATION

CRANK RANGE RC2

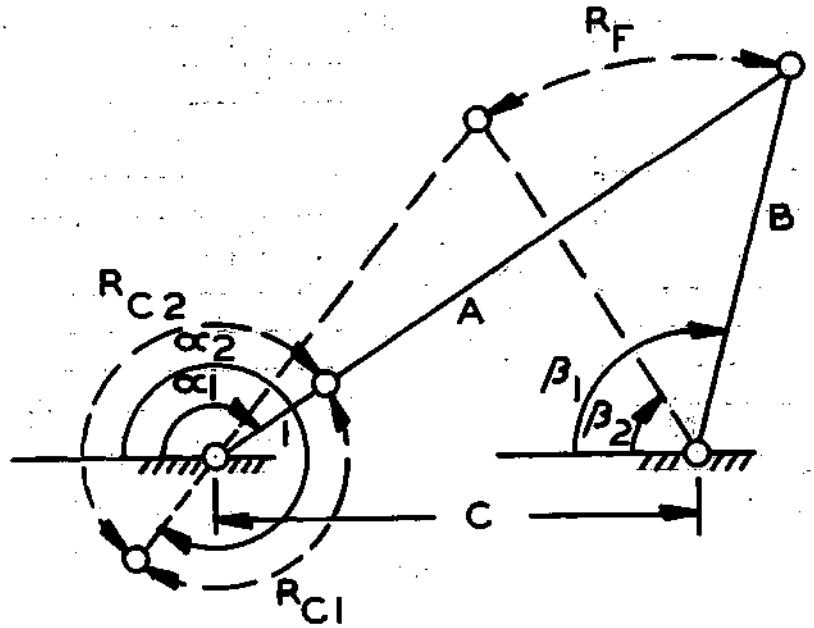
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 1.5

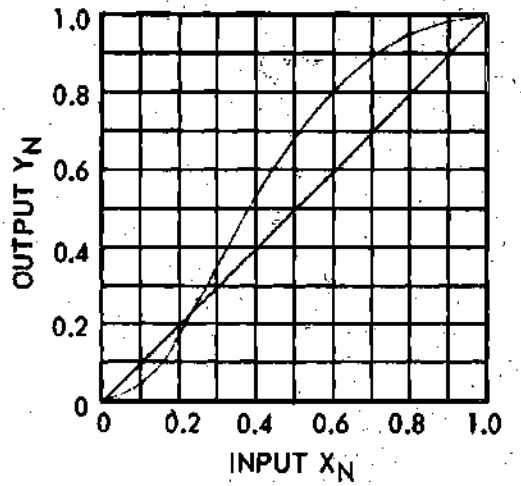
C = 3.5



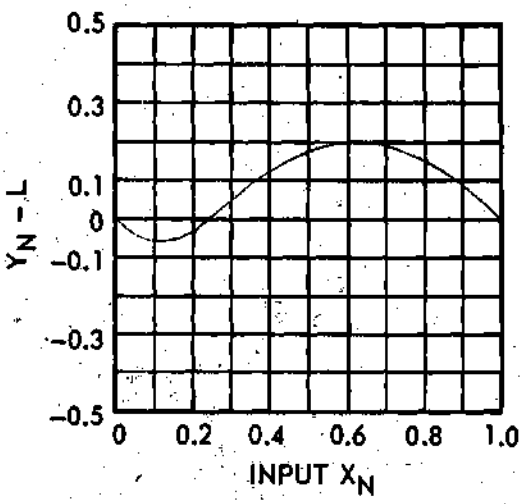
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.780873	$R_F = \beta_1 - \beta_2$
B = 2.0		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.502312	= 1.246126

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.041390	-0.058610	0.017520	-0.082480
0.167556	-0.032444	0.069231	-0.130769
0.346476	0.046476	0.152930	-0.147070
0.528428	0.128428	0.264354	-0.135646
0.683919	0.183919	0.397158	-0.102842
0.805136	0.205136	0.543489	-0.056511
0.893868	0.193868	0.693997	-0.006003
0.953984	0.153984	0.836271	0.036271
0.988696	0.088696	0.950328	0.050328
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

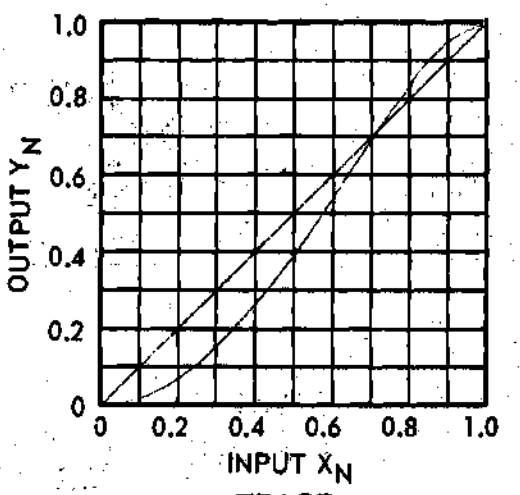


TRACE

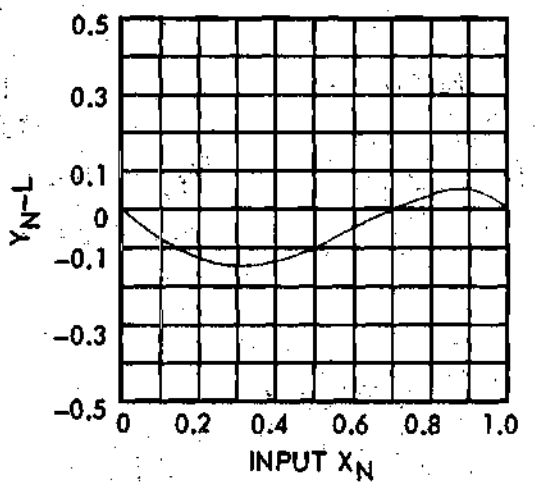


DEVIATION

CRANK RANGE RC1



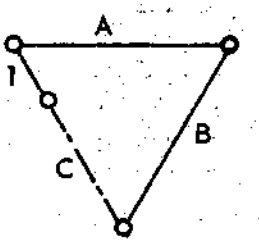
TRACE



DEVIATION

CRANK RANGE RC2

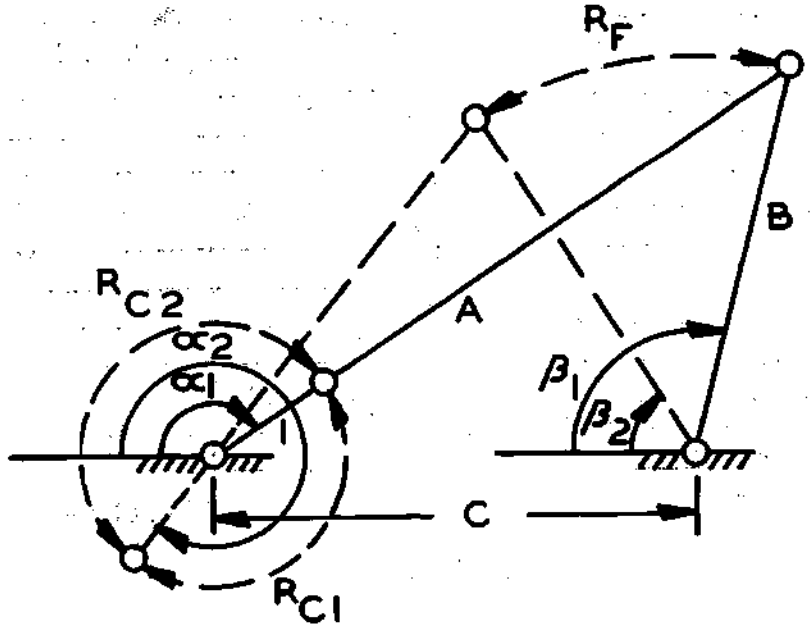
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.0

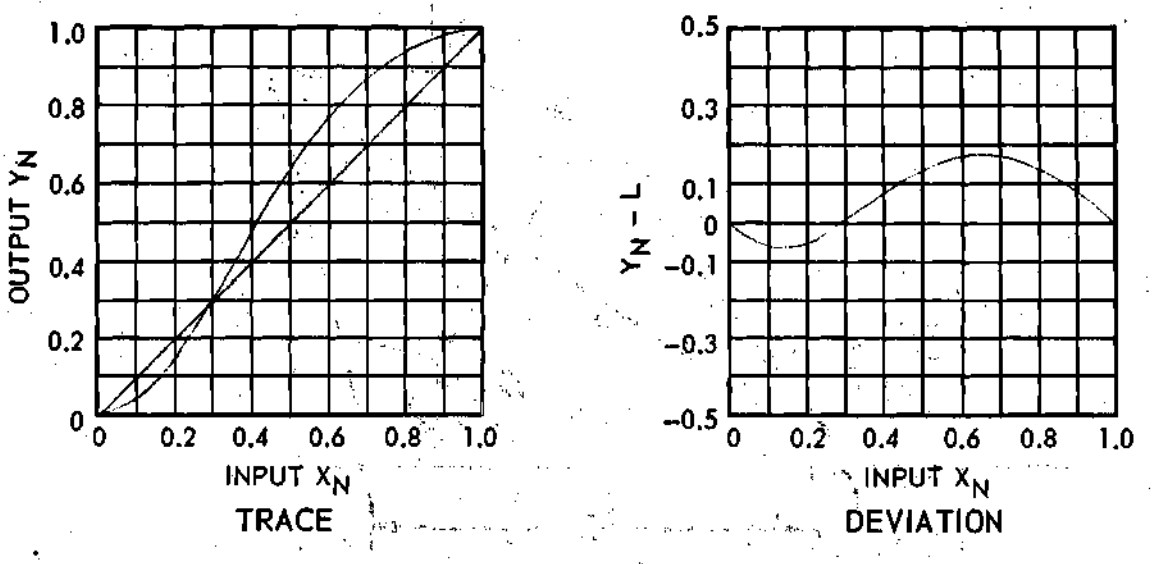
C = 3.0



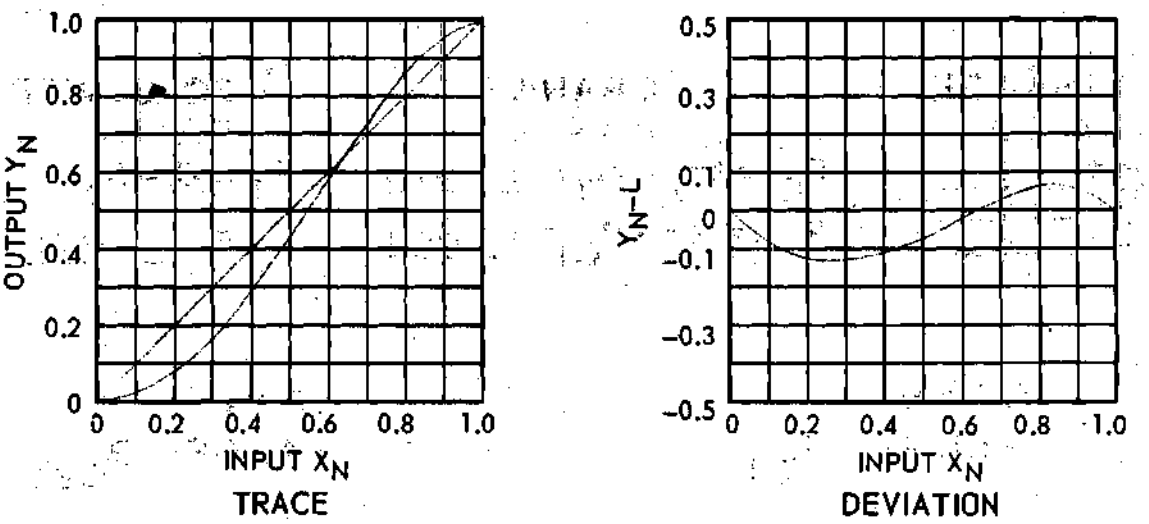
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.987323	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.295862	= 1.085355
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.037373	-0.062627	0.018549	-0.081451
0.148256	-0.051744	0.074697	-0.125303
0.309141	0.009141	0.166497	-0.133503
0.482361	0.082361	0.287807	-0.112193
0.639969	0.139969	0.429395	-0.070605
0.770089	0.170089	0.580582	-0.019418
0.870456	0.170456	0.729659	0.029659
0.941941	0.141941	0.862679	0.062679
0.985274	0.085274	0.961074	0.061074
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

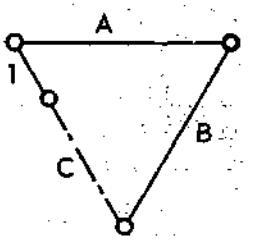


CRANK RANGE RC1



CRANK RANGE RC2

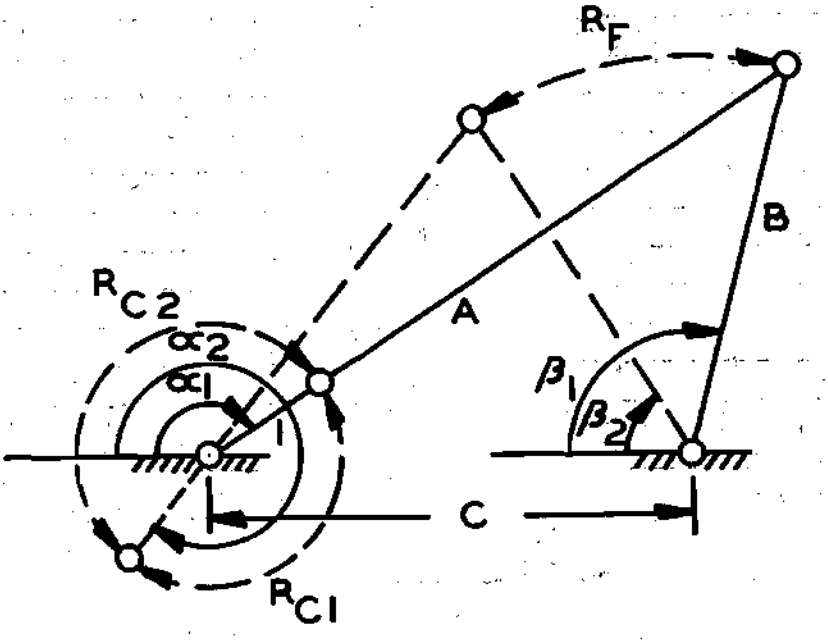
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.0

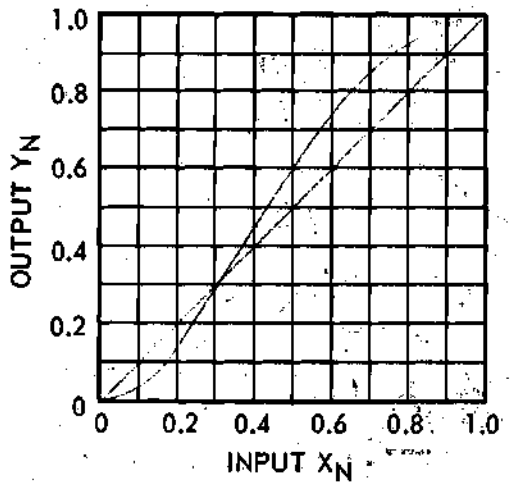
C = 3.5



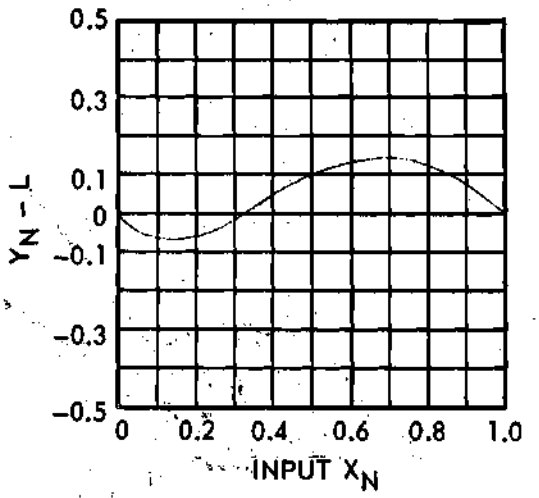
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.180644	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.102541	= 1.049672
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.035725	-0.064275	0.021092	-0.078908
0.138934	-0.061066	0.086319	-0.113681
0.287635	-0.012365	0.191588	-0.108412
0.450481	0.050481	0.325252	-0.074748
0.603813	0.103813	0.473669	-0.026331
0.736321	0.136321	0.624355	0.024355
0.844378	0.144378	0.765689	0.065689
0.926603	0.126603	0.885328	0.085328
0.980355	0.080355	0.968817	0.068817
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

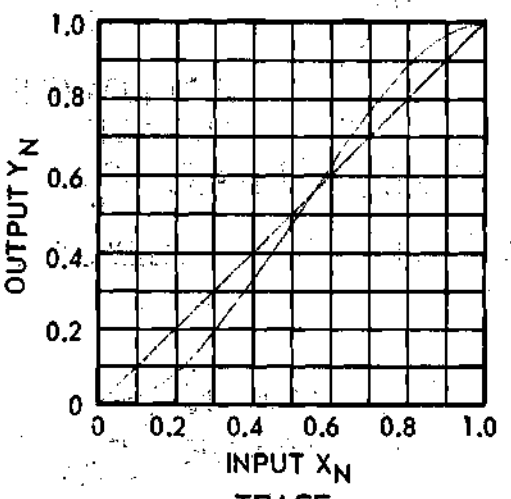


TRACE

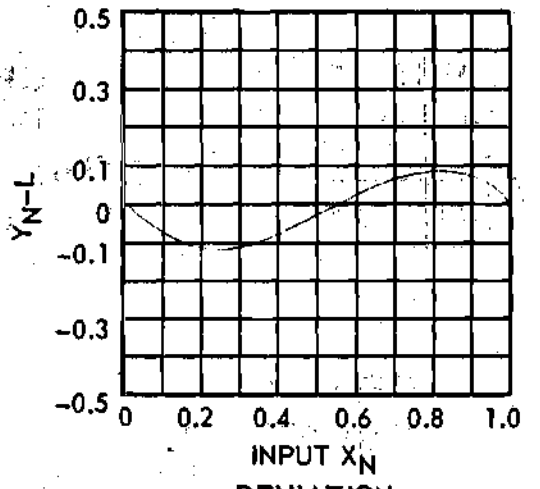


DEVIATION

CRANK RANGE RC1



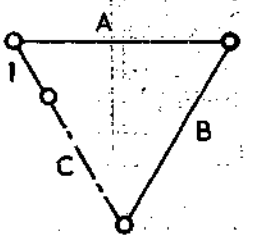
TRACE



DEVIATION

CRANK RANGE RC2

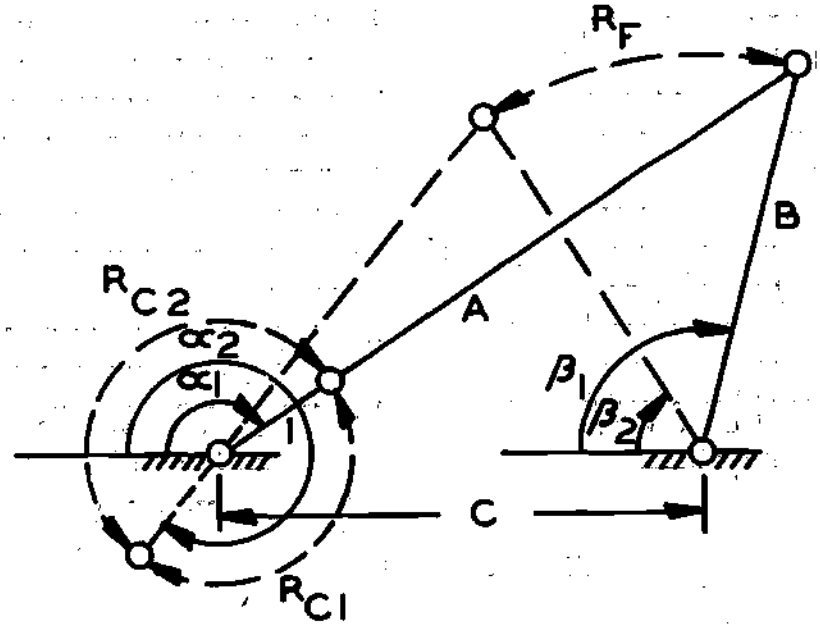
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.0

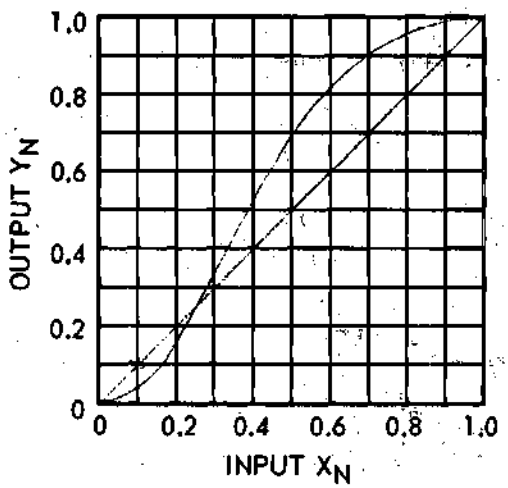
C = 4.0



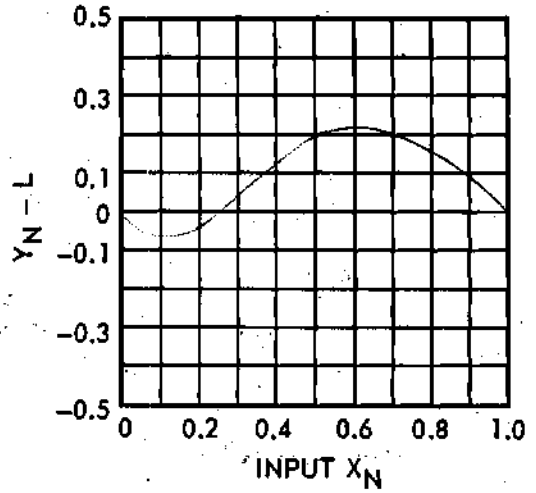
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.545422	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.737763	= 1.192341
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.036578	-0.063422	0.018292	-0.081708
0.156109	-0.043891	0.069933	-0.130067
0.339098	0.039098	0.151124	-0.148876
0.532240	0.132240	0.258149	-0.141851
0.695998	0.195998	0.386330	-0.113670
0.819222	0.219222	0.529539	-0.070461
0.905182	0.205182	0.679652	-0.020348
0.960402	0.160402	0.824916	0.024916
0.990618	0.090618	0.945171	0.045171
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

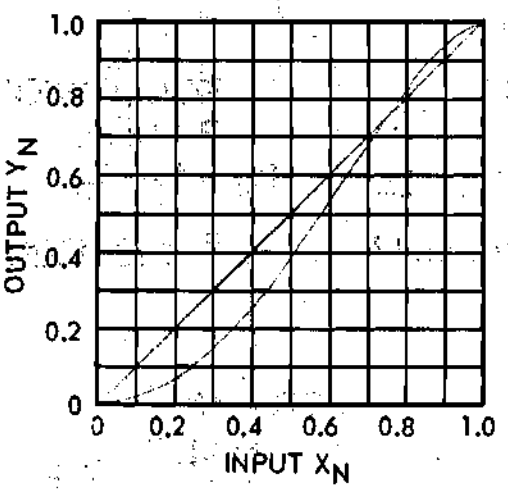


TRACE

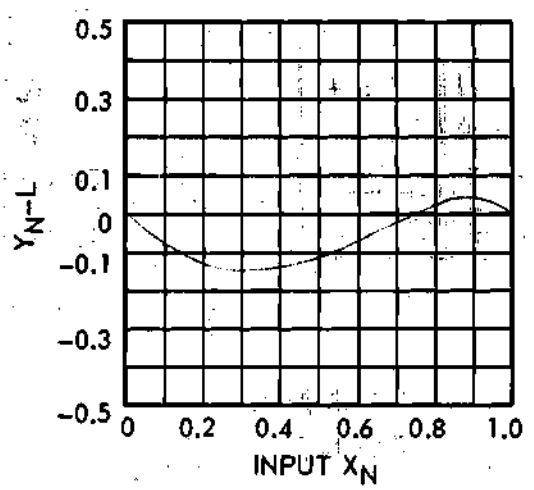


DEVIATION

CRANK RANGE RC1



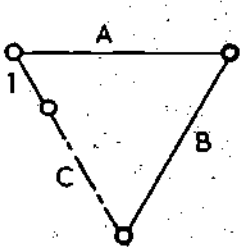
TRACE



DEVIATION

CRANK RANGE RC2

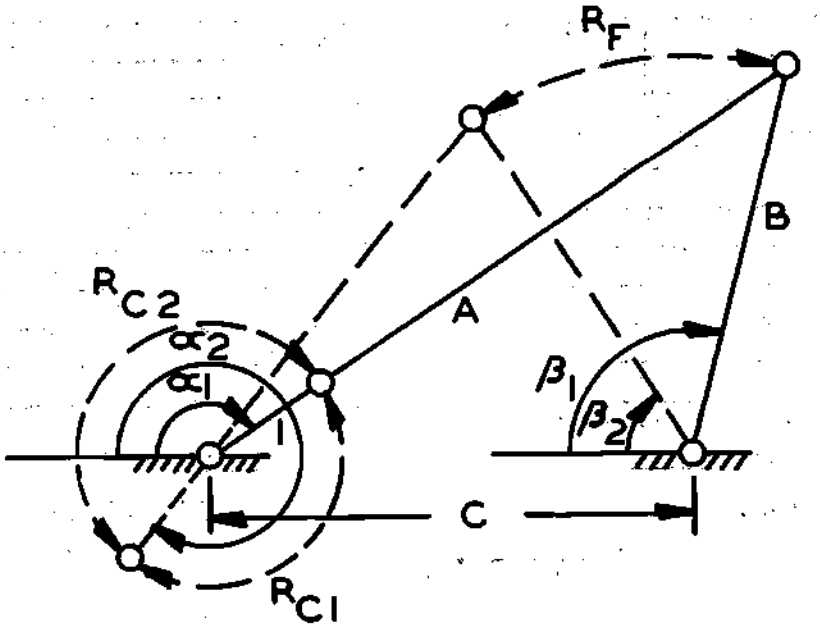
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.5

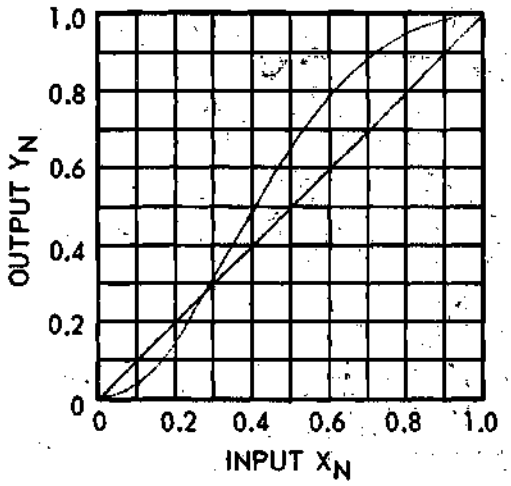
C = 3.5



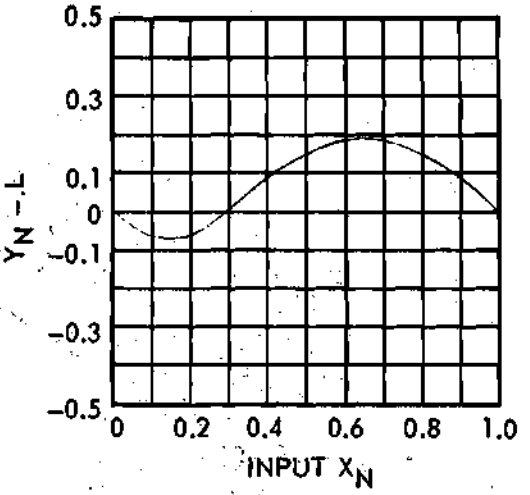
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.765583	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.517602	= 0.983338
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034465	-0.065535	0.018238	-0.081762
0.141758	-0.058242	0.071271	-0.128729
0.306075	0.006075	0.156421	-0.143579
0.488799	0.088799	0.269711	-0.130289
0.654835	0.154835	0.405090	-0.094910
0.787857	0.187857	0.554254	-0.045746
0.885532	0.185532	0.706397	0.006397
0.950991	0.150991	0.847049	0.047049
0.988126	0.088126	0.955286	0.055286
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

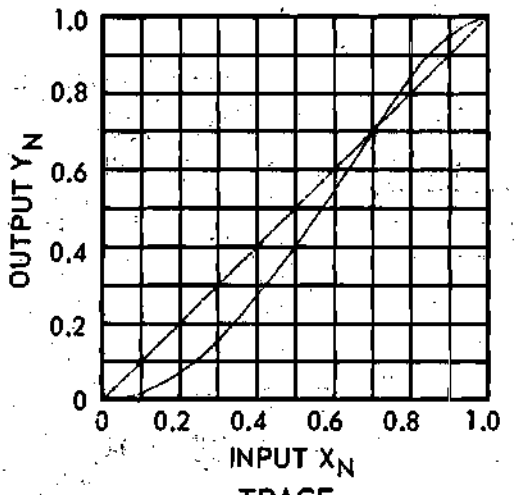


TRACE

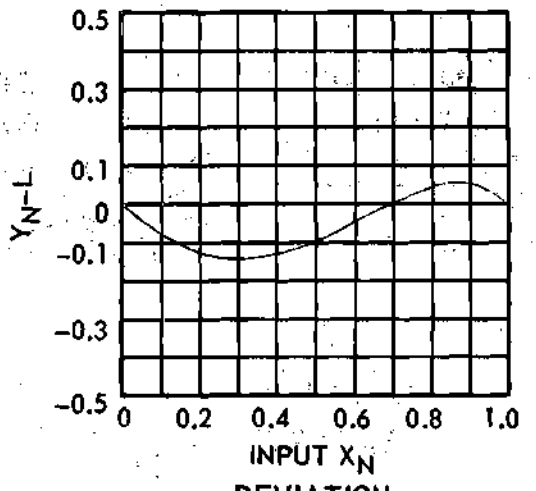


DEVIATION

CRANK RANGE RC1



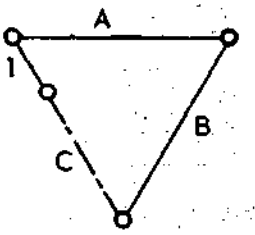
TRACE



DEVIATION

CRANK RANGE RC2

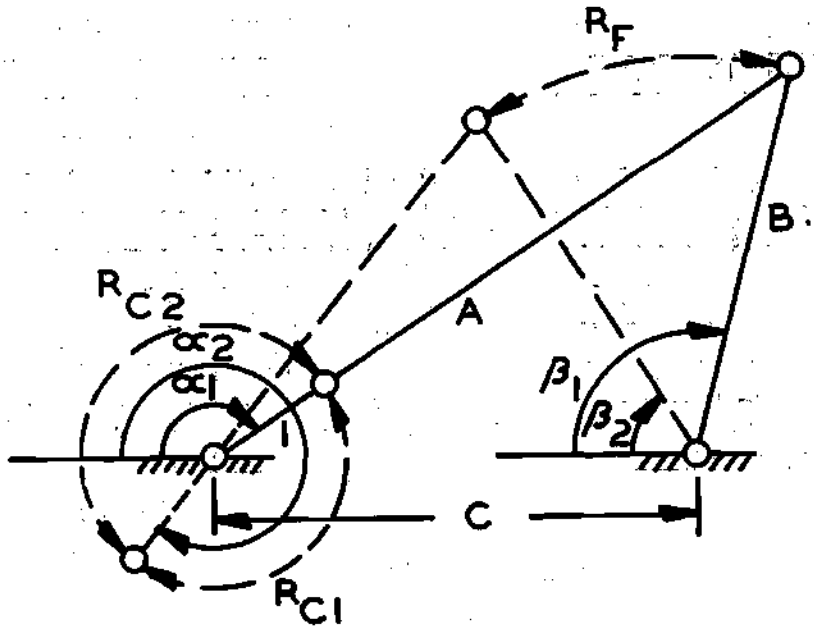
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.5

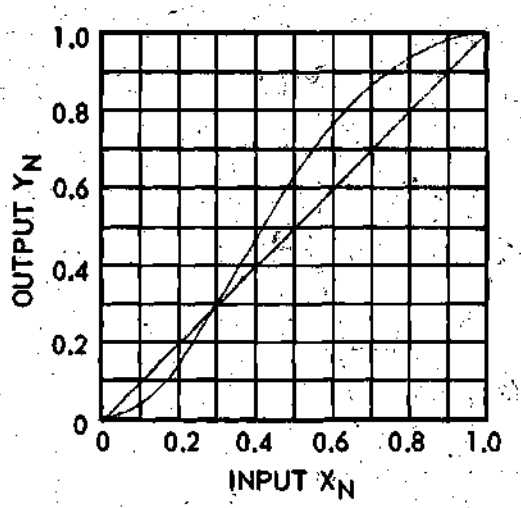
C = 3.0



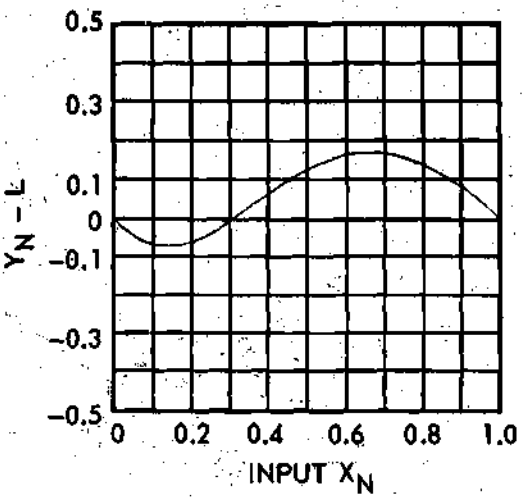
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.931879	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.351306	= 0.875565
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034299	-0.065701	0.018299	-0.081701
0.137563	-0.062437	0.072873	-0.127127
0.293060	-0.006940	0.161938	-0.138062
0.467700	0.067700	0.280903	-0.119097
0.631138	0.131138	0.422005	-0.077995
0.767115	0.167115	0.574828	-0.025172
0.870972	0.170972	0.726673	0.026673
0.943327	0.143327	0.862033	0.062033
0.985930	0.085930	0.961241	0.061241
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

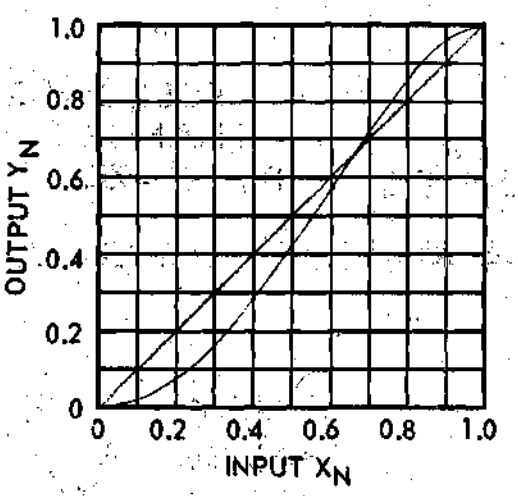


TRACE

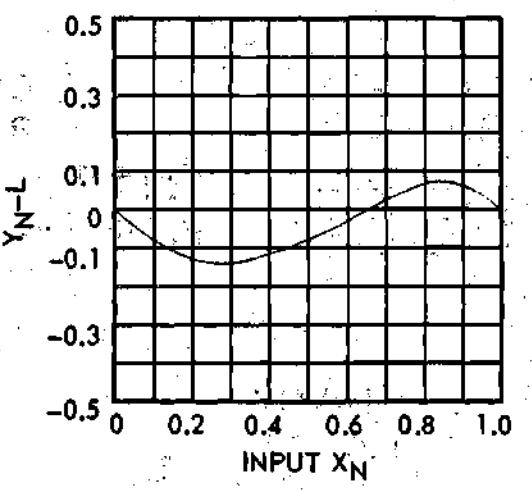


DEVIATION

CRANK RANGE RC1



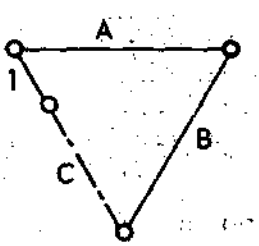
TRACE



DEVIATION

CRANK RANGE RC2

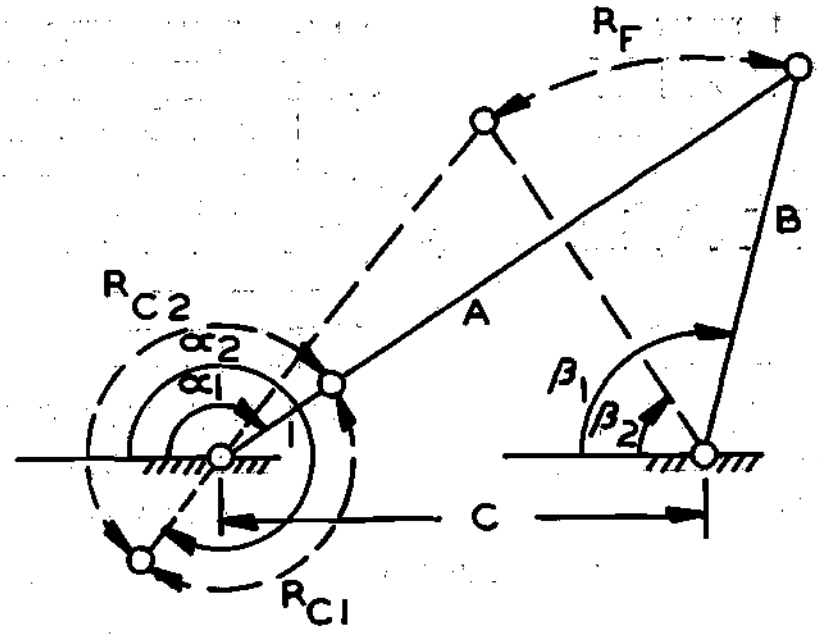
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.5

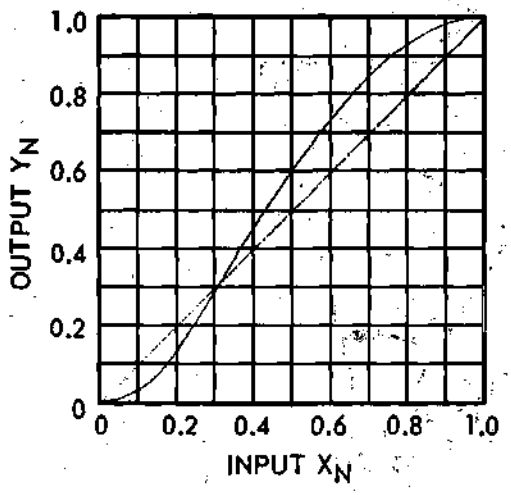
C = 3.5



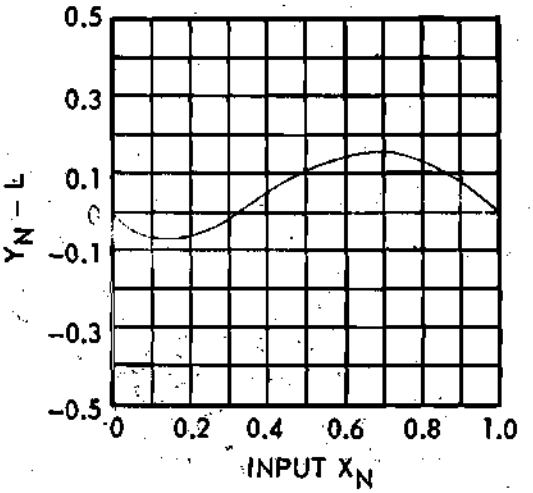
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.083777	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.199408	= 0.827128
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034368	-0.065632	0.018863	-0.081137
0.135121	-0.064879	0.076482	-0.123518
0.284191	-0.015809	0.171478	-0.128522
0.451679	0.051679	0.297555	-0.102445
0.611193	0.111193	0.444290	-0.055710
0.747870	0.147870	0.599049	-0.000951
0.856192	0.156192	0.748050	0.048050
0.934885	0.134885	0.876153	0.076153
0.983331	0.083331	0.966239	0.066239
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

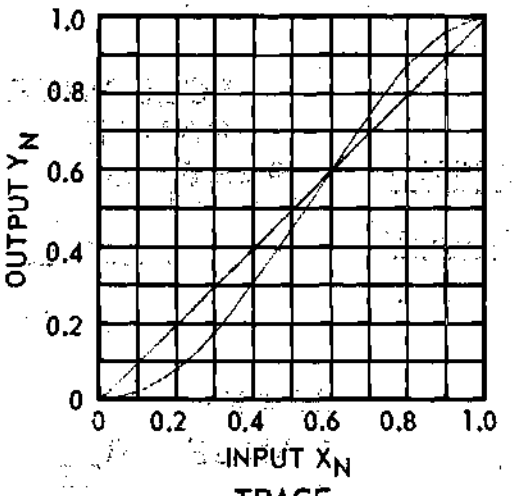


TRACE

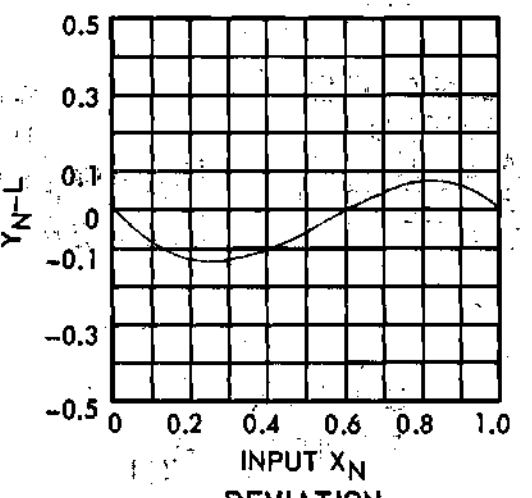


DEVIATION

CRANK RANGE RC1



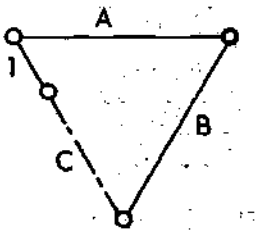
TRACE



DEVIATION

CRANK RANGE RC2

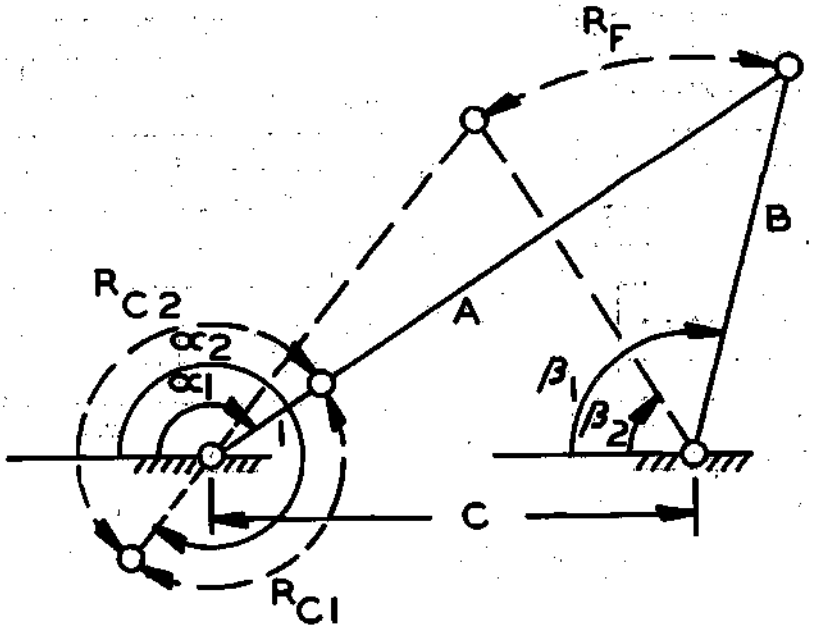
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.5

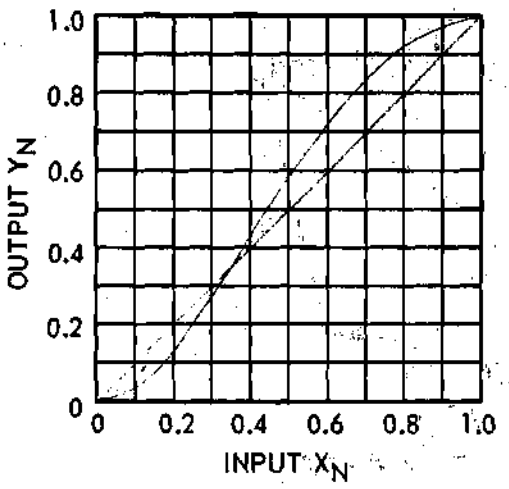
C = 4.0



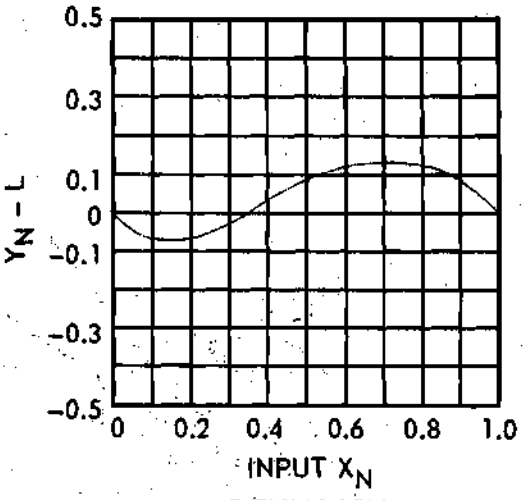
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.253526	$R_F = \beta_1 - \beta_2$
B = 2.5		= 0.838289
C = 4.5	$R_{C2} = 2\pi - R_{C1} =$ 3.029659	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034072	-0.065928	0.021152	-0.078848
0.131588	-0.068412	0.087241	-0.112759
0.273353	-0.026647	0.194984	-0.105016
0.432241	0.032241	0.332444	-0.067556
0.585840	0.085840	0.484618	-0.015382
0.721614	0.121614	0.637398	0.037398
0.834281	0.134281	0.777948	0.077948
0.921202	0.121202	0.893709	0.093709
0.978729	0.078729	0.971795	0.071795
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

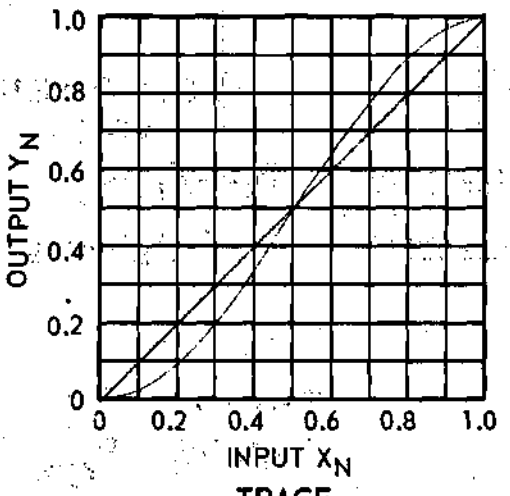


TRACE

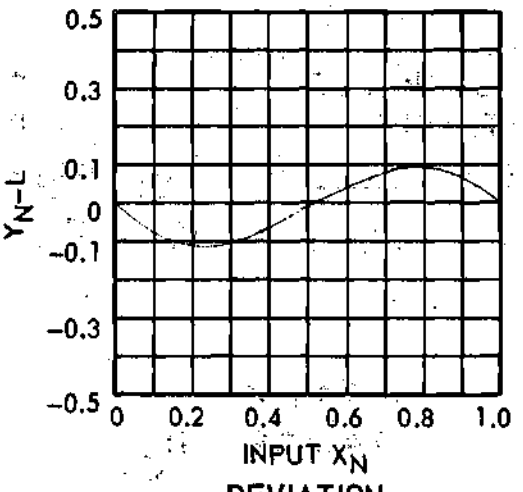


DEVIATION

CRANK RANGE RC1



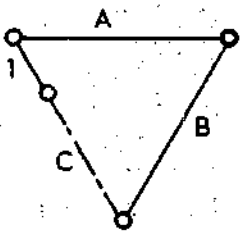
TRACE



DEVIATION

CRANK RANGE RC2

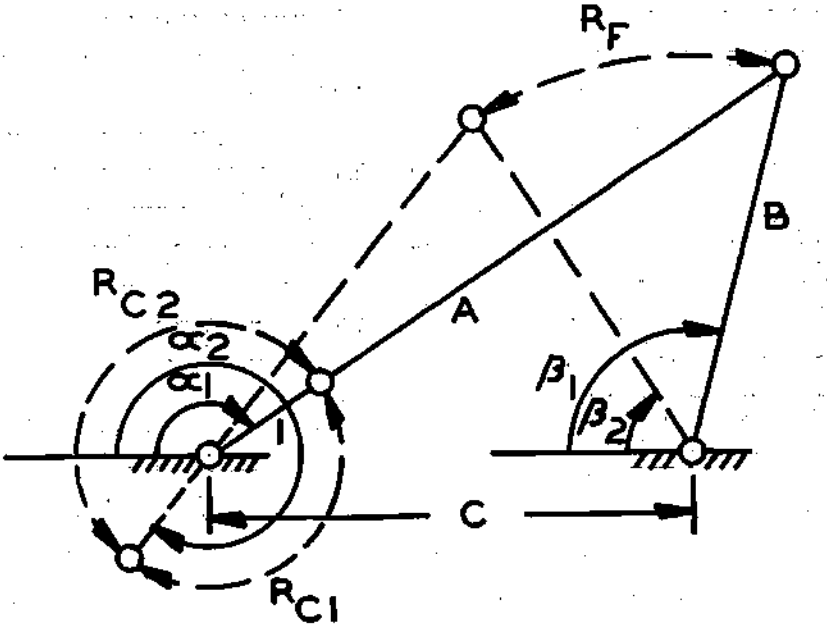
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 2.5

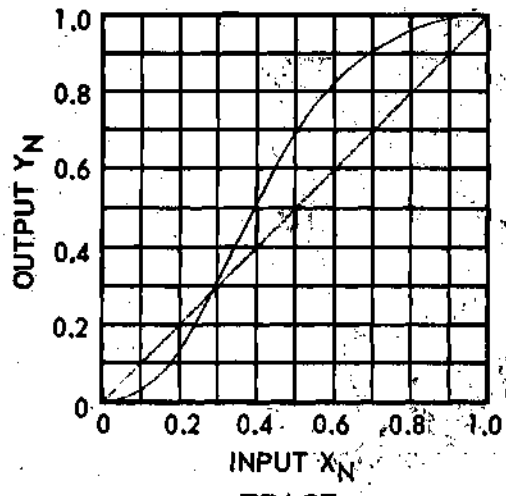
C = 4.5



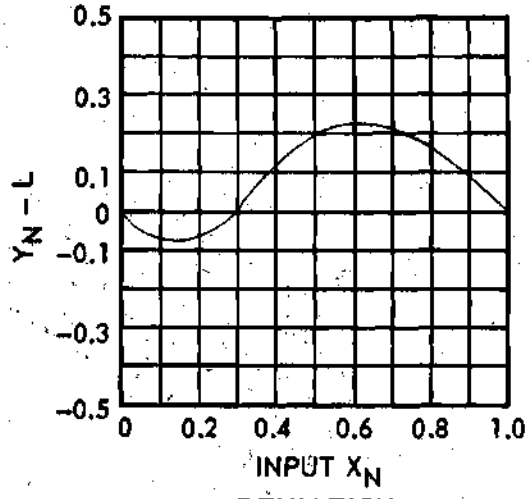
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.256186	$R_F = \beta_1 - \beta_2$
B = 3.0		
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 4.026999	= 1.246126

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.029168	-0.070832	0.020858	-0.079142
0.132940	-0.067060	0.076083	-0.123917
0.312781	0.012781	0.158732	-0.141268
0.520181	0.120181	0.264418	-0.135582
0.698552	0.198552	0.389157	-0.110843
0.827987	0.227987	0.528142	-0.071858
0.913429	0.213429	0.674745	-0.025255
0.965222	0.165222	0.818734	0.018734
0.992049	0.092049	0.941307	0.041307
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

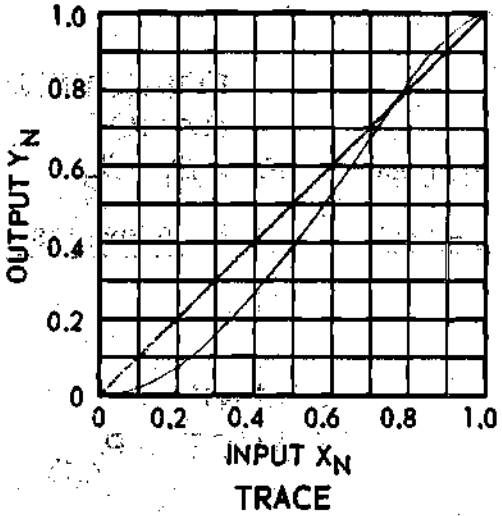


TRACE

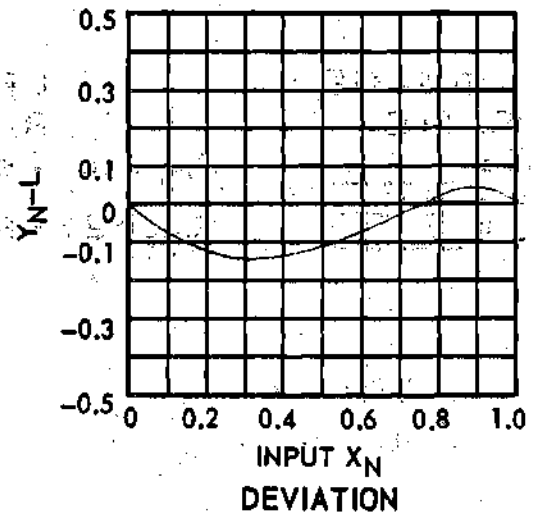


DEVIATION

CRANK RANGE RC1



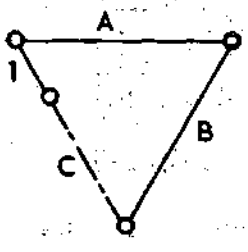
TRACE



DEVIATION

CRANK RANGE RC2

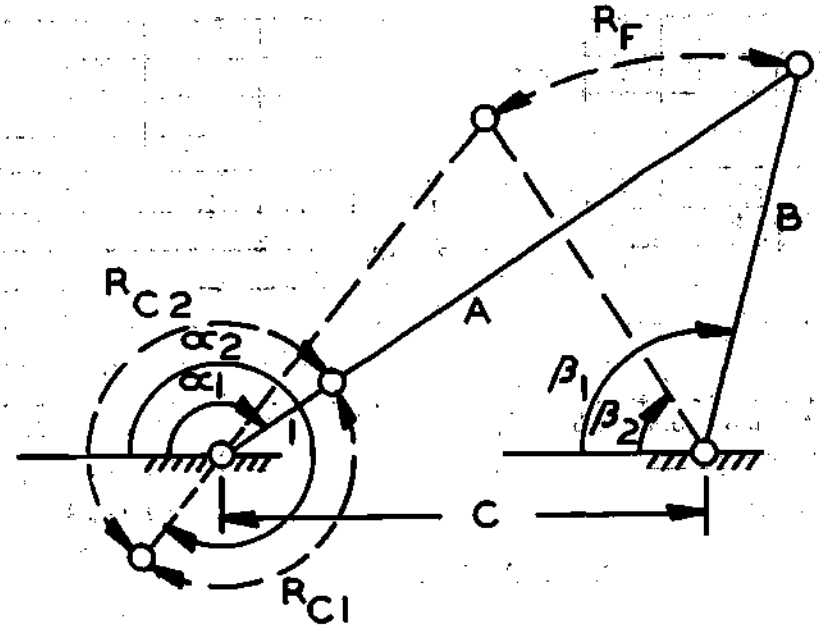
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

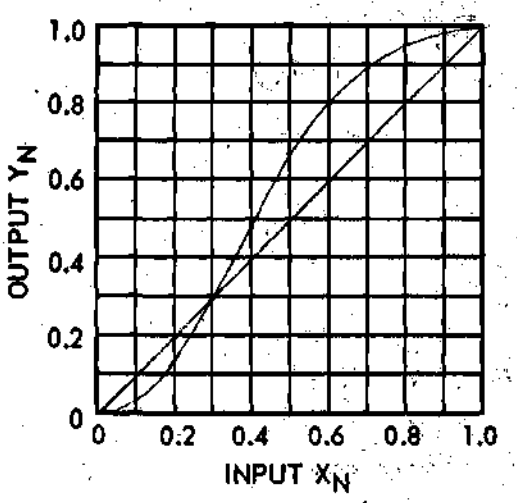
C = 2.0



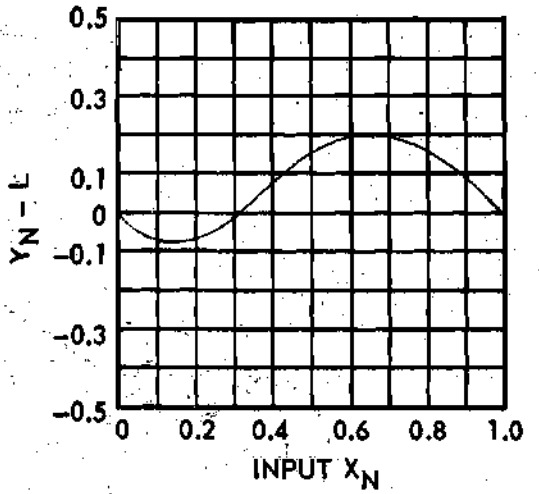
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.534264	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.748921	= 0.983338
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.029742	-0.070258	0.019778	-0.080222
0.127585	-0.072415	0.074499	-0.125501
0.289033	-0.010967	0.159120	-0.140880
0.479637	0.079637	0.269433	-0.130567
0.656298	0.156298	0.400550	-0.099450
0.795324	0.195324	0.545895	-0.054105
0.893407	0.193407	0.696300	-0.003700
0.955975	0.155975	0.838432	0.038432
0.989698	0.089698	0.951337	0.051337
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

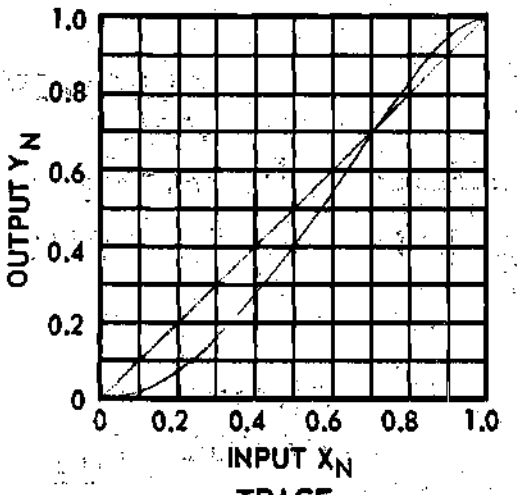


TRACE

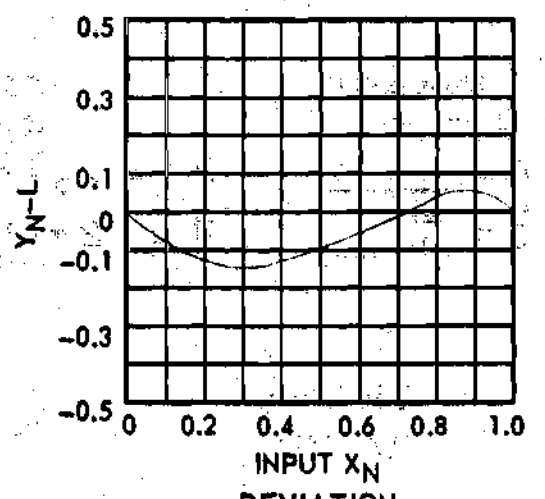


DEVIATION

CRANK RANGE RC1



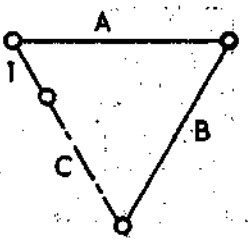
TRACE



DEVIATION

CRANK RANGE RC2

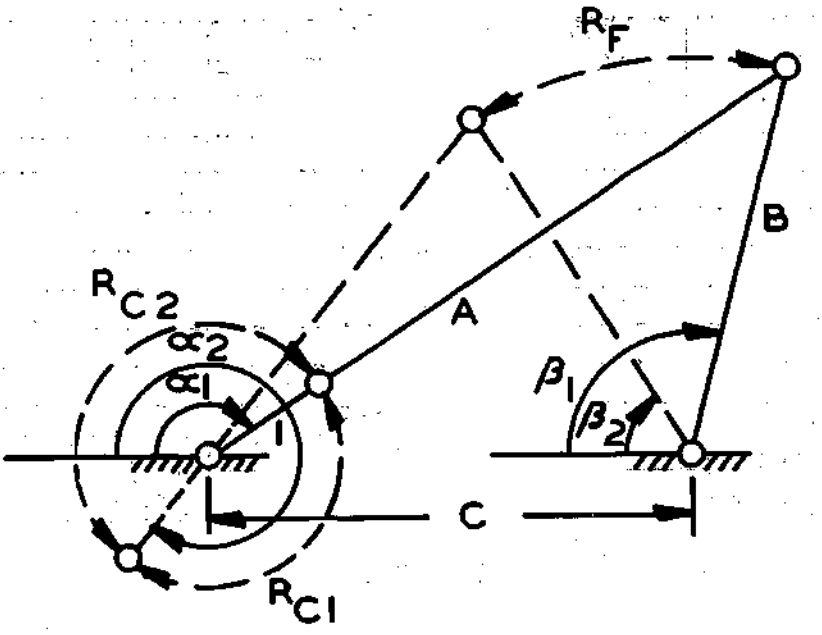
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

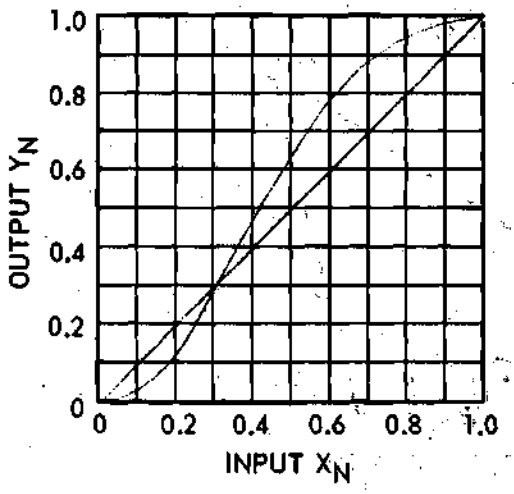
C = 2.5



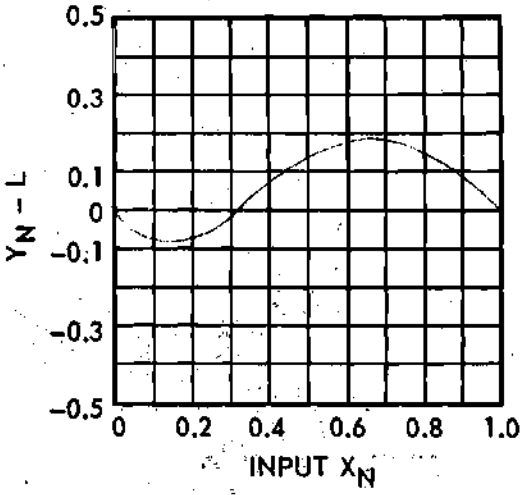
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.723306	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.559879	= 0.836573
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.030947	-0.069053	0.019013	-0.080987
0.128289	-0.071711	0.073337	-0.126663
0.283057	-0.016943	0.159443	-0.140557
0.464372	0.064372	0.273287	-0.126713
0.636360	0.136360	0.409115	-0.090885
0.777160	0.177160	0.558746	-0.041254
0.880793	0.180793	0.711022	0.011022
0.949555	0.149555	0.850782	0.050782
0.987935	0.087935	0.956882	0.056882
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

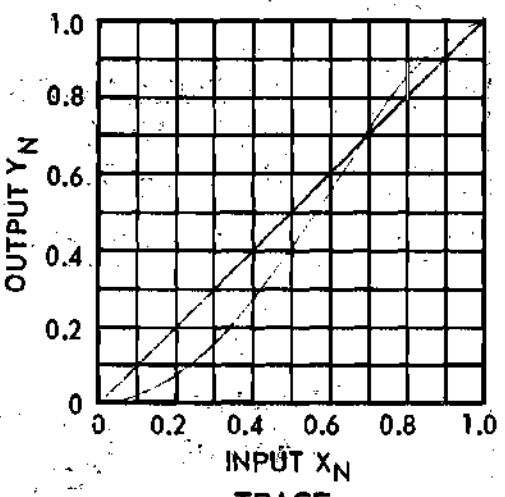


TRACE

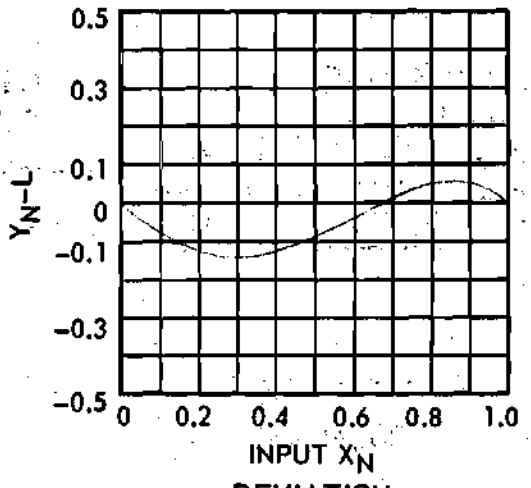


DEVIATION

CRANK RANGE RC1



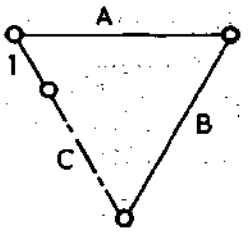
TRACE



DEVIATION

CRANK RANGE RC2

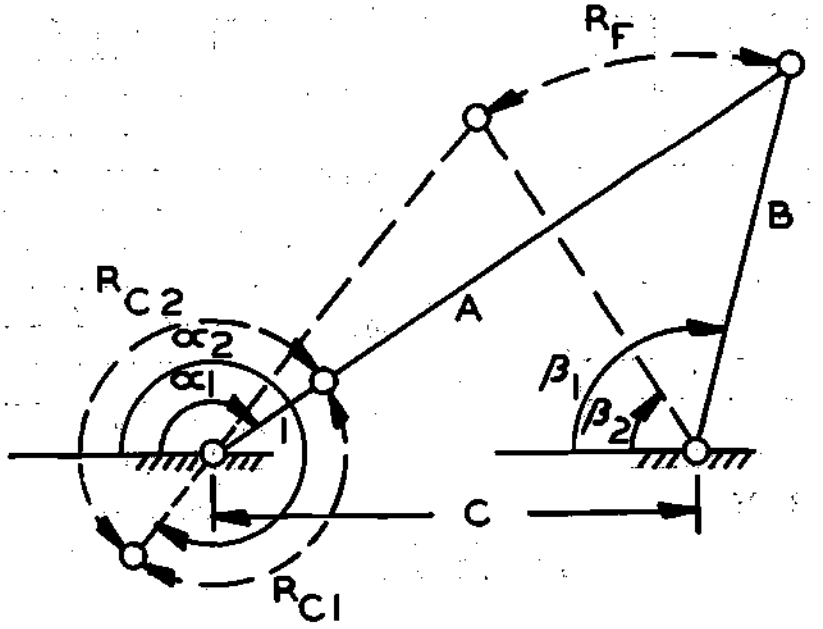
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

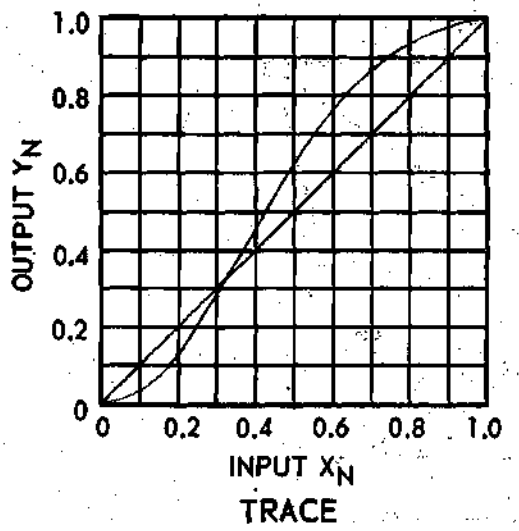
C = 3.0



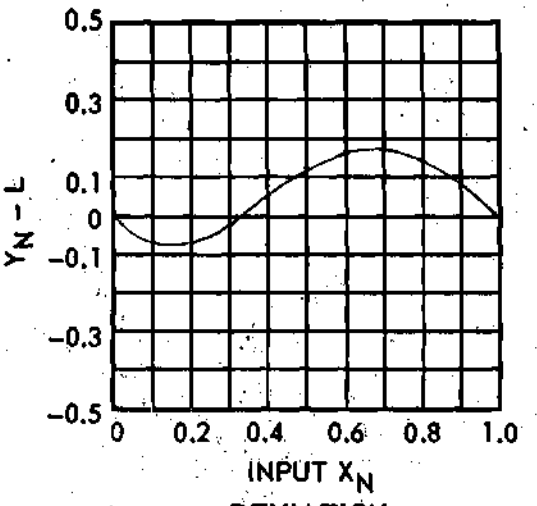
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.873345	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.409840	= 0.747966
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032045	-0.067955	0.018550	-0.081450
0.129653	-0.070347	0.072963	-0.127037
0.280548	-0.019452	0.160926	-0.139074
0.455497	0.055497	0.278357	-0.121643
0.623166	0.123166	0.418433	-0.081567
0.763880	0.163880	0.571327	-0.028673
0.870763	0.170763	0.724209	0.024209
0.944073	0.144073	0.860885	0.060885
0.986336	0.086336	0.960981	0.060981
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

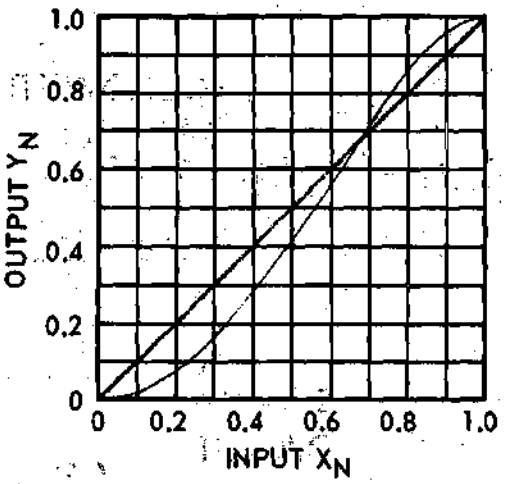


TRACE

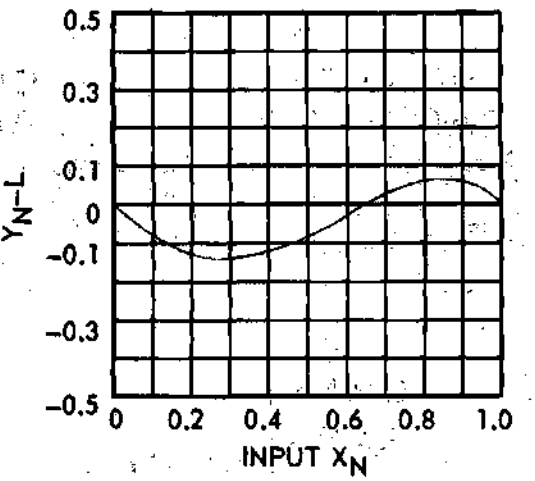


DEVIATION

CRANK RANGE RC1



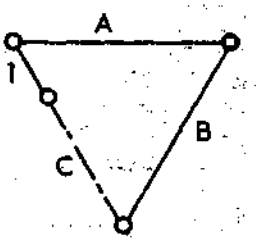
TRACE



DEVIATION

CRANK RANGE RC2

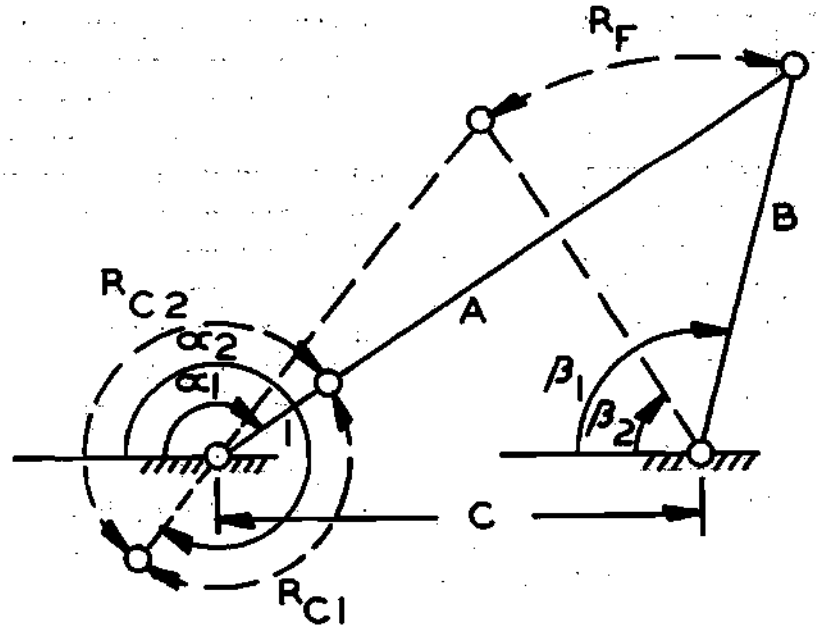
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

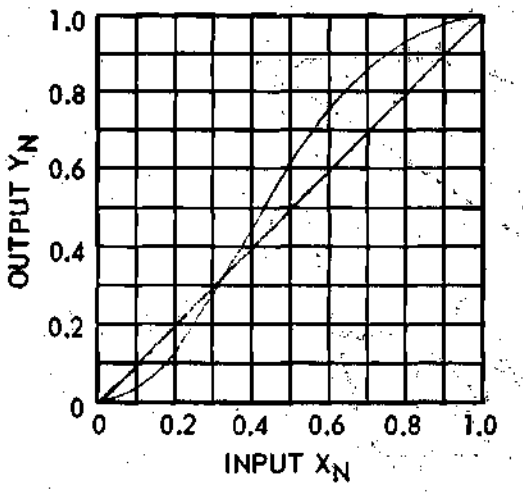
C = 3.5



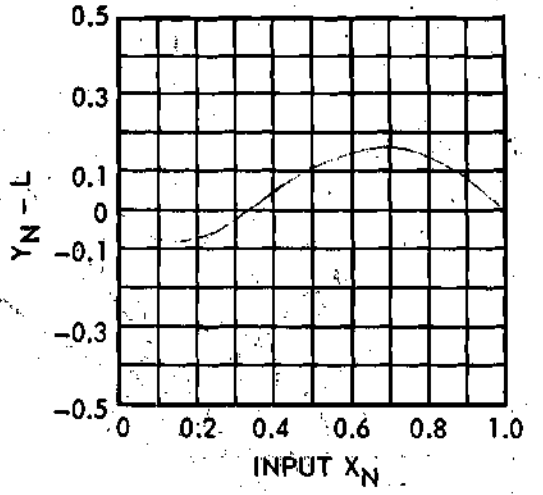
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.007119	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.276066	= 0.697434
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032922	-0.067078	0.018426	-0.081574
0.130642	-0.069358	0.073774	-0.126226
0.278318	-0.021682	0.164676	-0.135324
0.447908	0.047908	0.286551	-0.113449
0.611515	0.111515	0.431006	-0.068994
0.751551	0.151551	0.586368	-0.013632
0.860924	0.160924	0.738451	0.038451
0.938399	0.138399	0.870799	0.070799
0.984597	0.084597	0.964636	0.064636
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

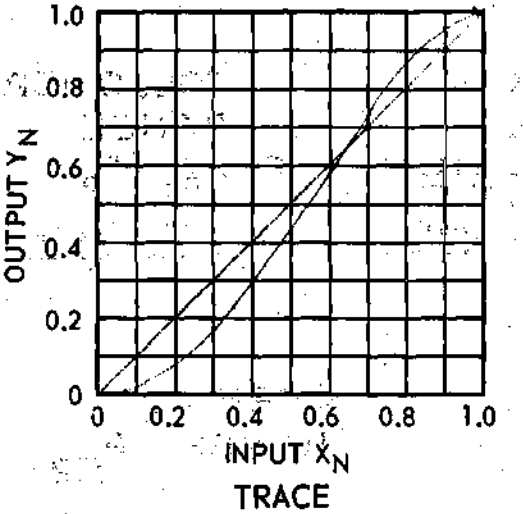


TRACE

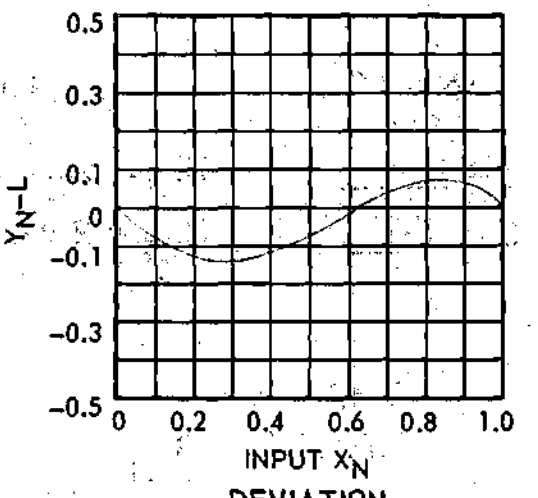


DEVIATION

CRANK RANGE RC1



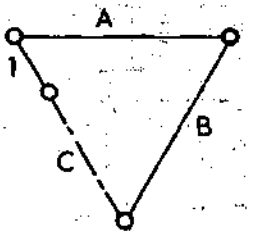
TRACE



DEVIATION

CRANK RANGE RC2

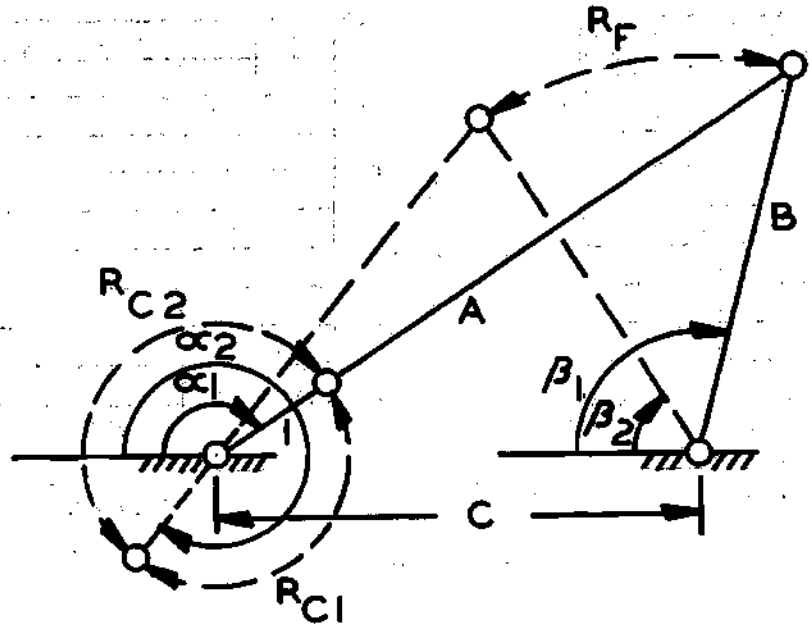
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

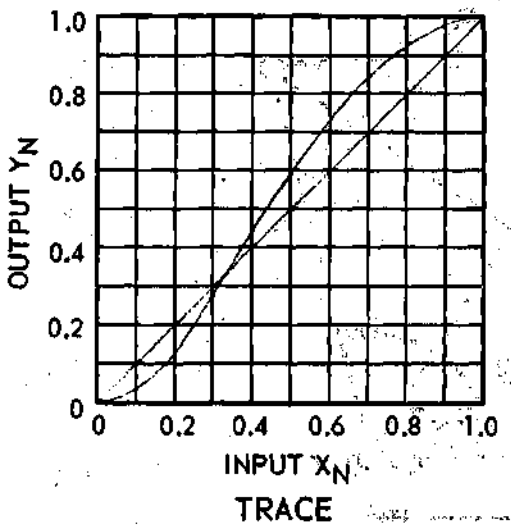
C = 4.0



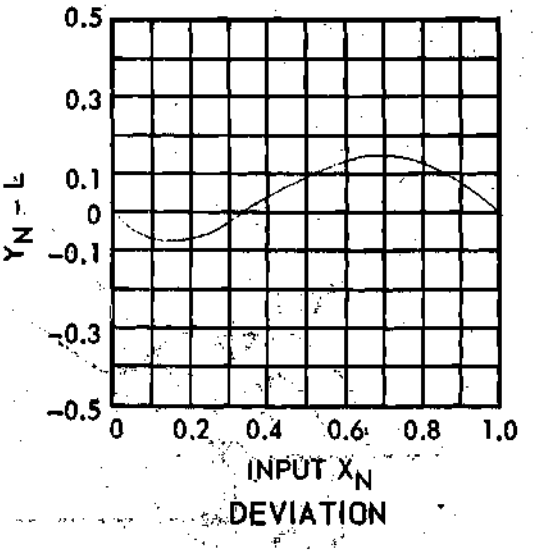
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.141592	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.141593	= 0.679674
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033490	-0.066510	0.018876	-0.081124
0.130665	-0.069335	0.076920	-0.123080
0.274668	-0.025332	0.173249	-0.126751
0.438693	0.038693	0.301631	-0.098369
0.597940	0.097940	0.451016	-0.048984
0.736946	0.136946	0.607633	0.007633
0.848814	0.148814	0.756572	0.056572
0.931081	0.131081	0.882231	0.082231
0.982245	0.082245	0.968473	0.068473
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

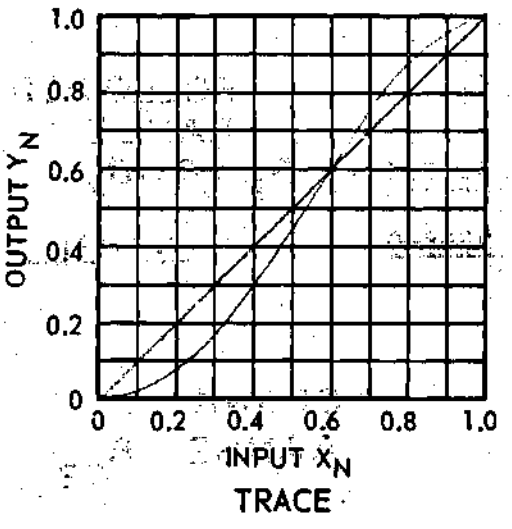


TRACE

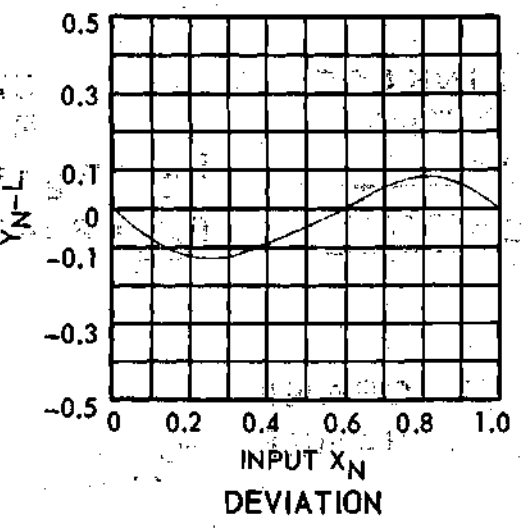


DEVIATION

CRANK RANGE RC1



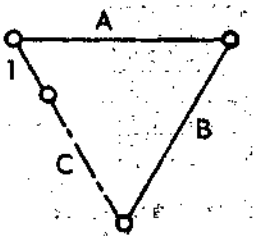
TRACE



DEVIATION

CRANK RANGE RC2

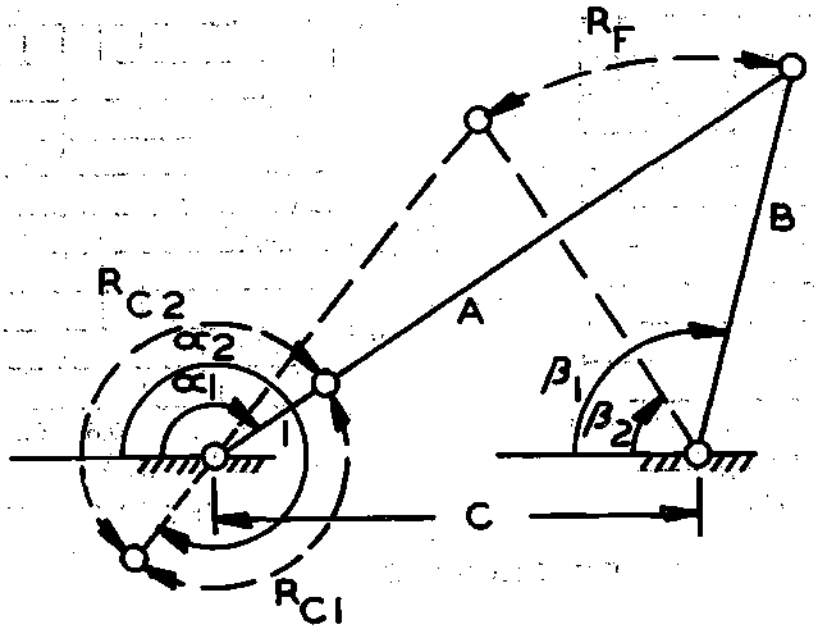
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

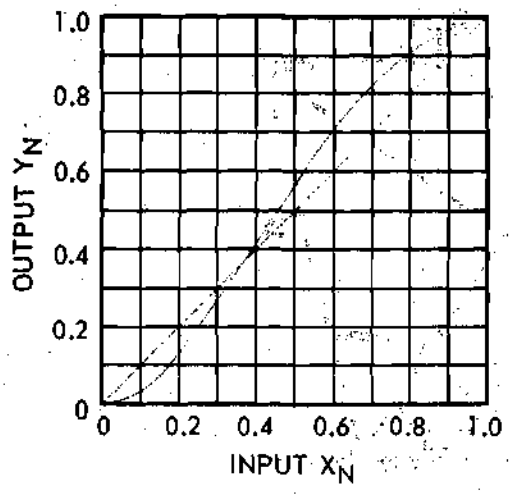
C = 4.5



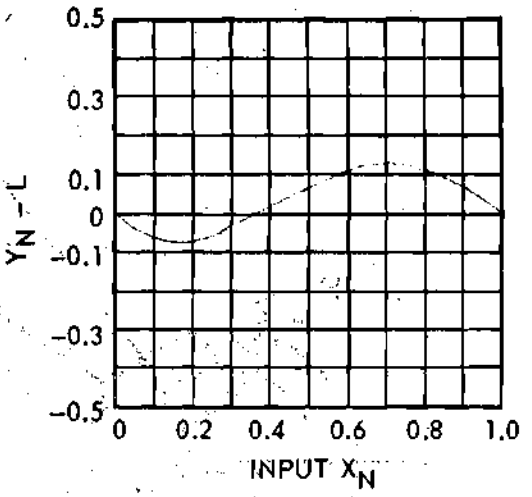
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.302325	$R_F = \beta_1 - \beta_2$
B = 3.0		
C = 5.0	$R_{C2} = 2\pi - R_{C1} =$ 2.980860	= 0.704917

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033489	-0.066511	0.021057	-0.078943
0.128565	-0.071435	0.087361	-0.112639
0.266869	-0.033131	0.196328	-0.103672
0.423295	0.023295	0.335973	-0.064027
0.576465	0.076465	0.490419	-0.009581
0.713558	0.113558	0.644484	0.044484
0.828523	0.128523	0.784599	0.084599
0.918009	0.118009	0.898178	0.098178
0.977732	0.077732	0.973343	0.073343
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

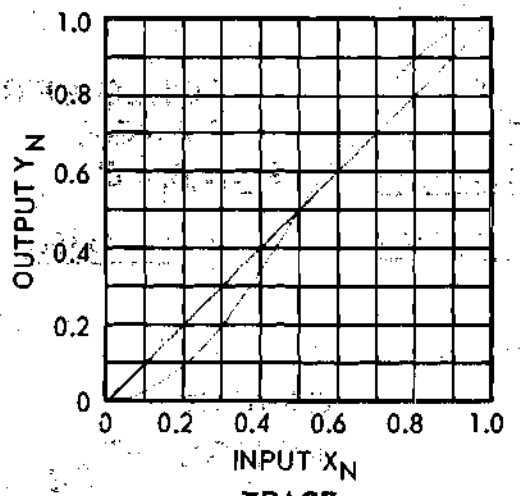


TRACE

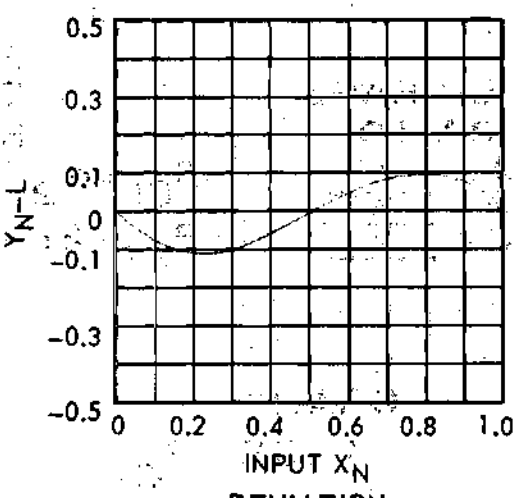


DEVIATION

GRASHOF RATIO TG1



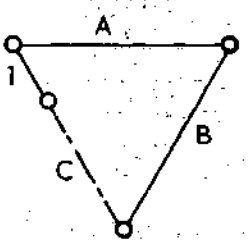
TRACE



DEVIATION

GRASHOF RATIO TG2

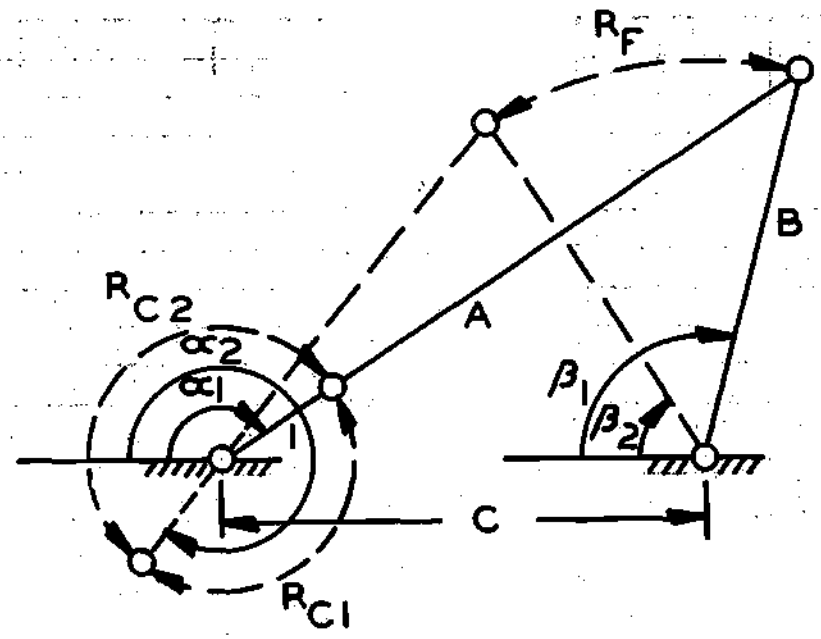
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.0

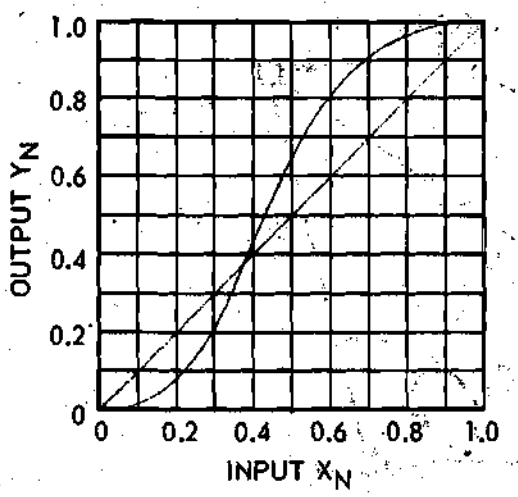
C = 5.0



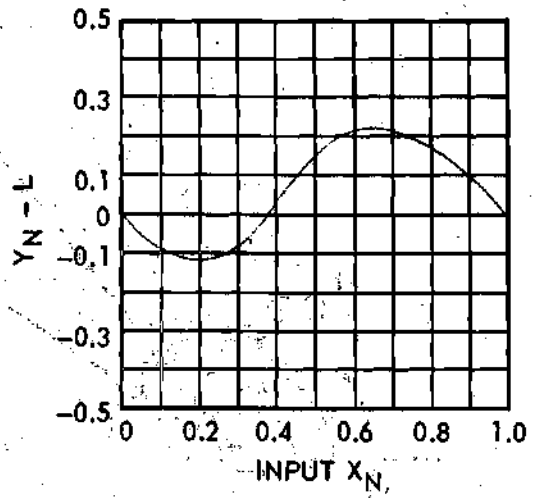
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 1.755820	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 4.527365	= 1.483366
C = 1.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.016417	-0.083583	0.028908	-0.071092
0.079874	-0.120126	0.094778	-0.105222
0.216348	-0.083652	0.183348	-0.116652
0.430391	0.030391	0.289291	-0.110709
0.656266	0.156266	0.409631	-0.090369
0.820423	0.220423	0.541329	-0.058671
0.917536	0.217536	0.679872	-0.020128
0.969411	0.169411	0.817476	0.017476
0.993460	0.093460	0.938282	0.038282
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

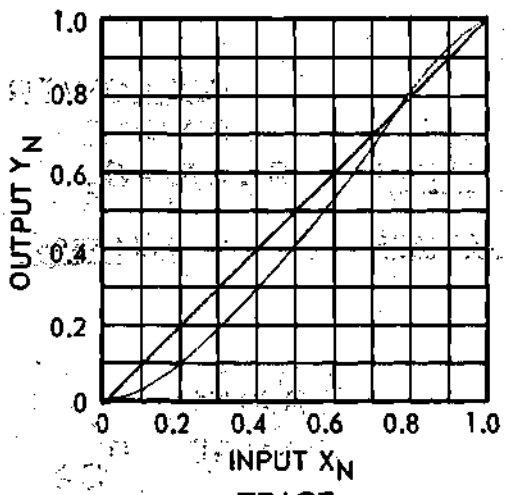


TRACE

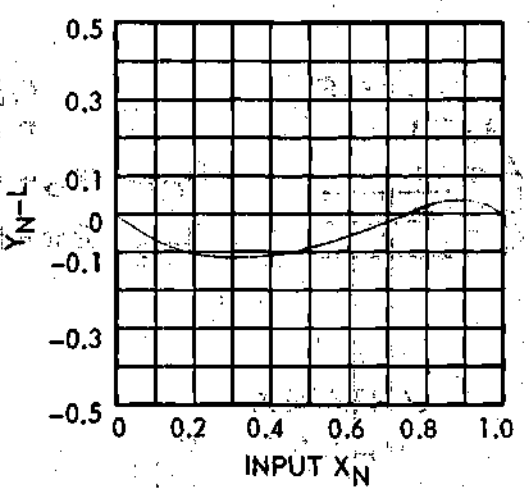


DEVIATION

CRANK RANGE RC1



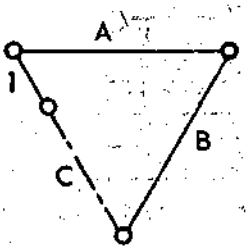
TRACE



DEVIATION

CRANK RANGE RC2

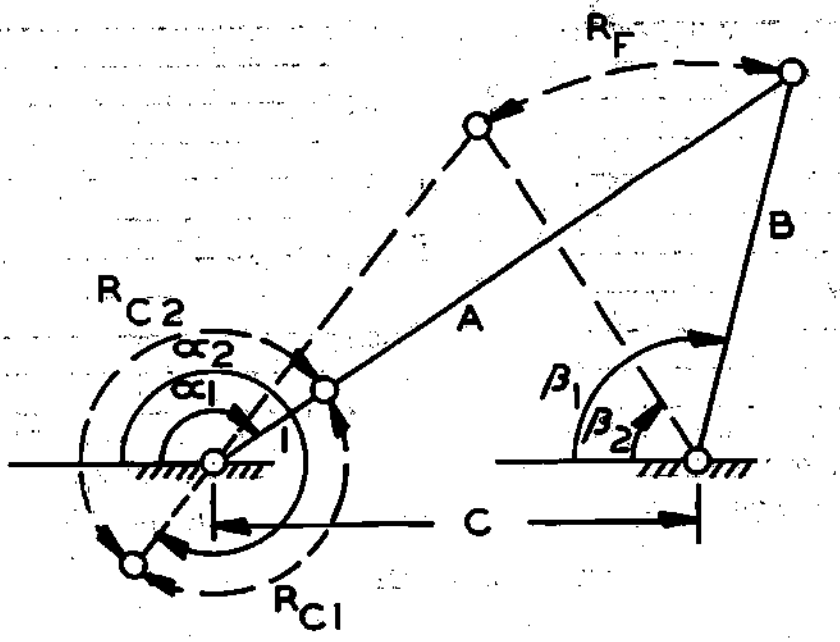
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

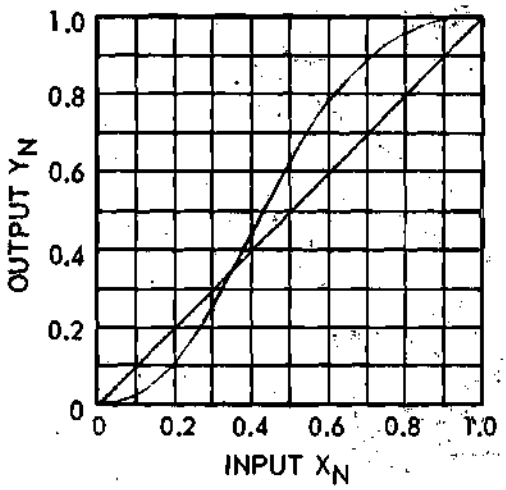
C = 1.5



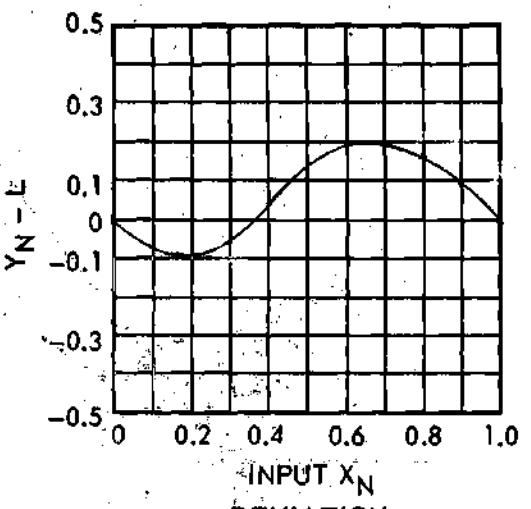
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.210507	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 4.072678	= 1.085355

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.022173	-0.077827	0.023889	-0.076111
0.100008	-0.099992	0.084588	-0.115412
0.244243	-0.055757	0.172407	-0.127593
0.438955	0.038955	0.282039	-0.117961
0.635738	0.135738	0.409260	-0.090740
0.791808	0.191808	0.549094	-0.050906
0.896845	0.196845	0.694387	-0.005613
0.959451	0.159451	0.833894	0.033894
0.990936	0.090936	0.948211	0.048211
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

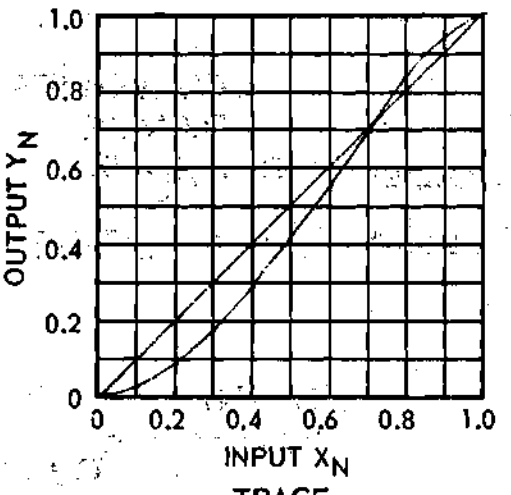


TRACE

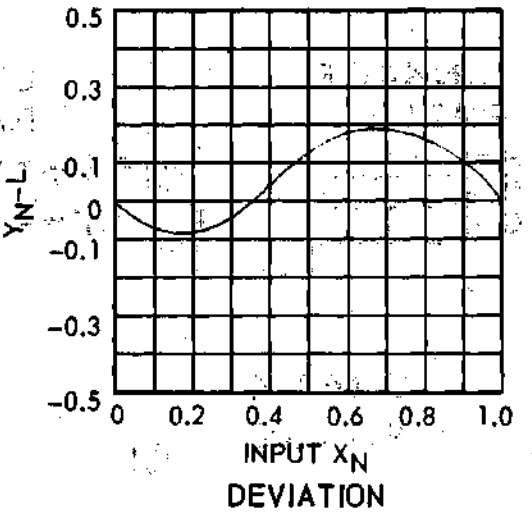


DEVIATION

CRANK RANGE RC1



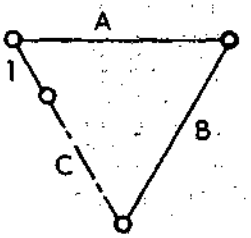
TRACE



DEVIATION

CRANK RANGE RC2

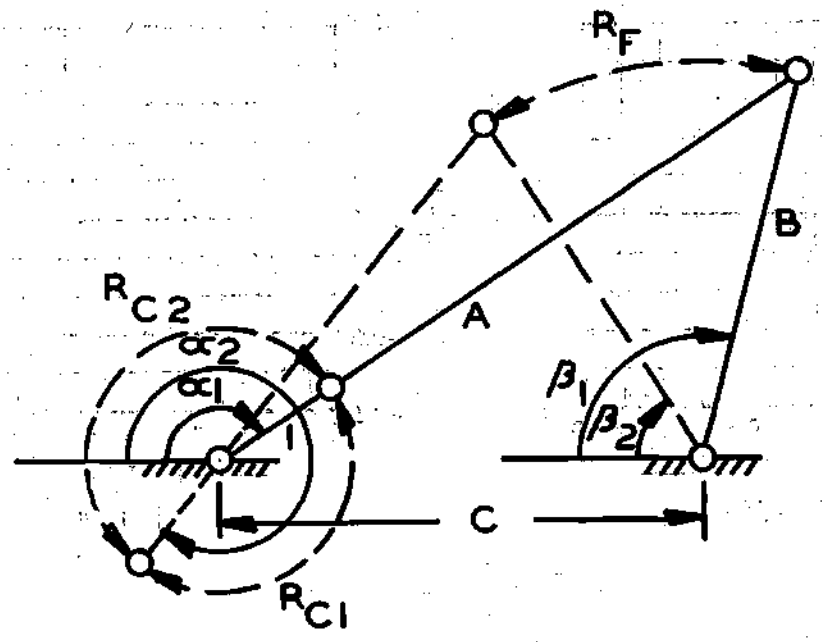
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

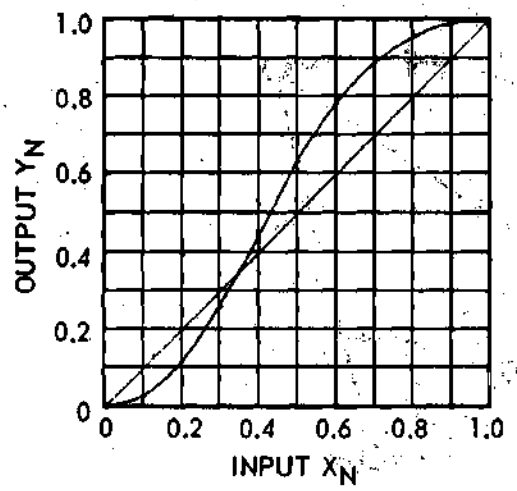
C = 2.0



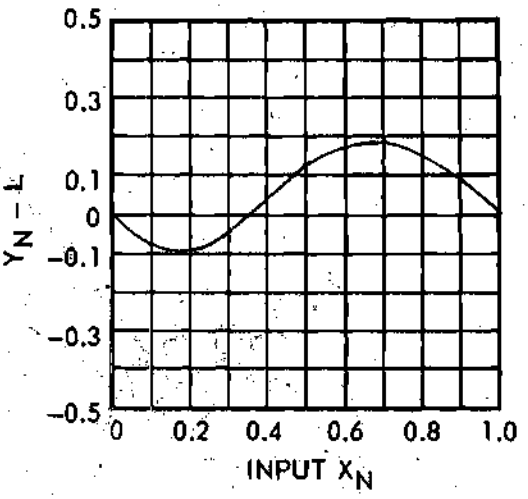
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.475741	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.807444	= 0.875565
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.025696	-0.074304	0.021469	-0.078531
0.110786	-0.089214	0.079246	-0.120753
0.256963	-0.043037	0.166551	-0.133449
0.442240	0.042240	0.278559	-0.121441
0.626473	0.126473	0.410343	-0.089657
0.777586	0.177586	0.555430	-0.044570
0.885265	0.185265	0.704592	0.004592
0.953272	0.153272	0.844258	0.044258
0.989234	0.089234	0.953645	0.053645
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

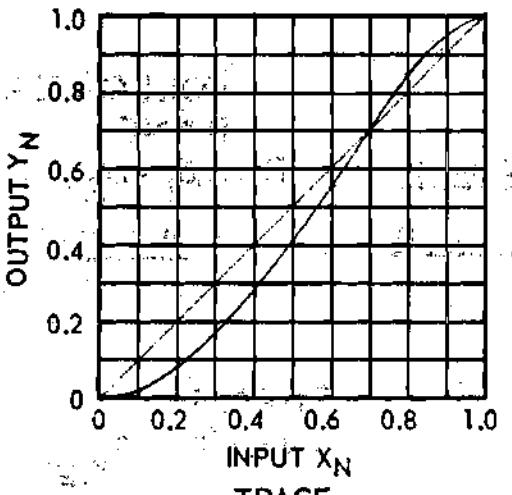


TRACE

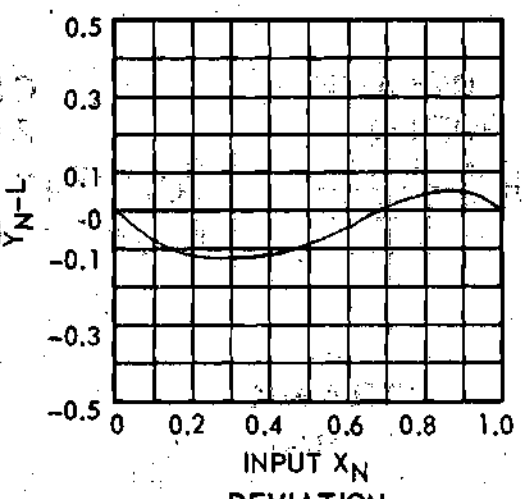


DEVIATION

CRANK RANGE RC1



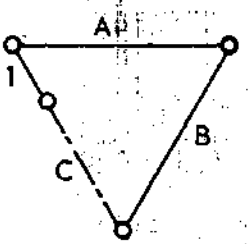
TRACE



DEVIATION

CRANK RANGE RC2

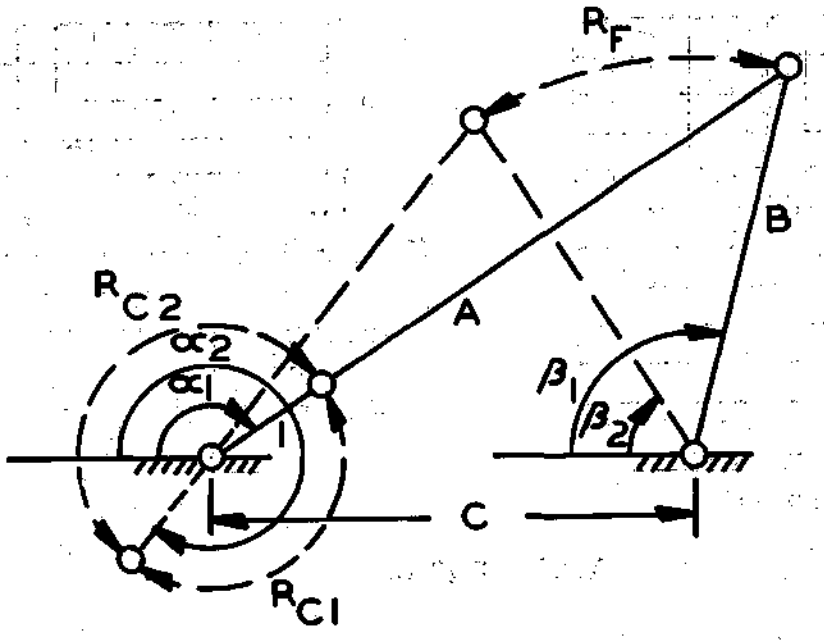
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

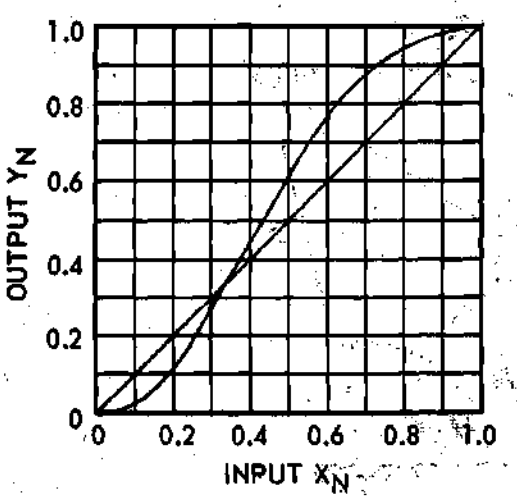
C = 2.5



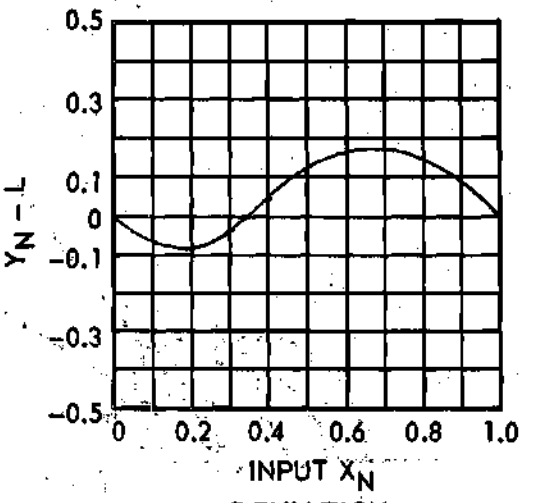
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.661874	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.621311	= 0.747966

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.028152	-0.071848	0.020034	-0.079966
0.117662	-0.082338	0.076055	-0.123945
0.264252	-0.035748	0.163319	-0.136681
0.443480	0.043480	0.277458	-0.122542
0.620199	0.120199	0.412941	-0.087059
0.767973	0.167973	0.561953	-0.038047
0.877005	0.177005	0.713508	0.013508
0.948594	0.148594	0.852388	0.052388
0.987873	0.087873	0.957458	0.057458
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

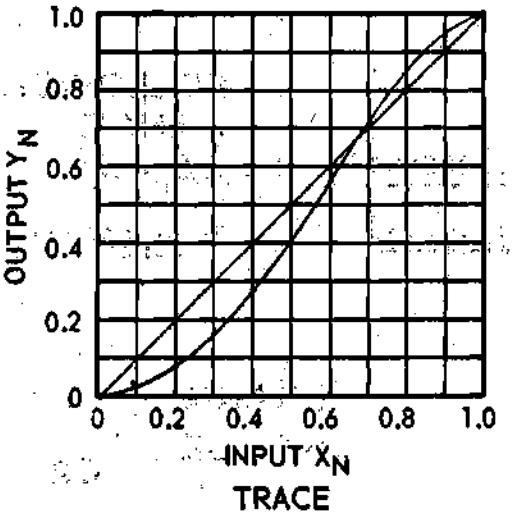


TRACE

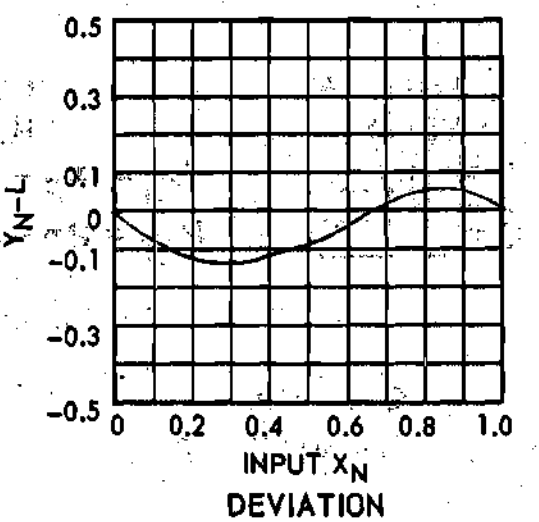


DEVIATION

CRANK RANGE RC1



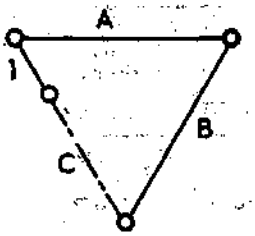
TRACE



DEVIATION

CRANK RANGE RC2

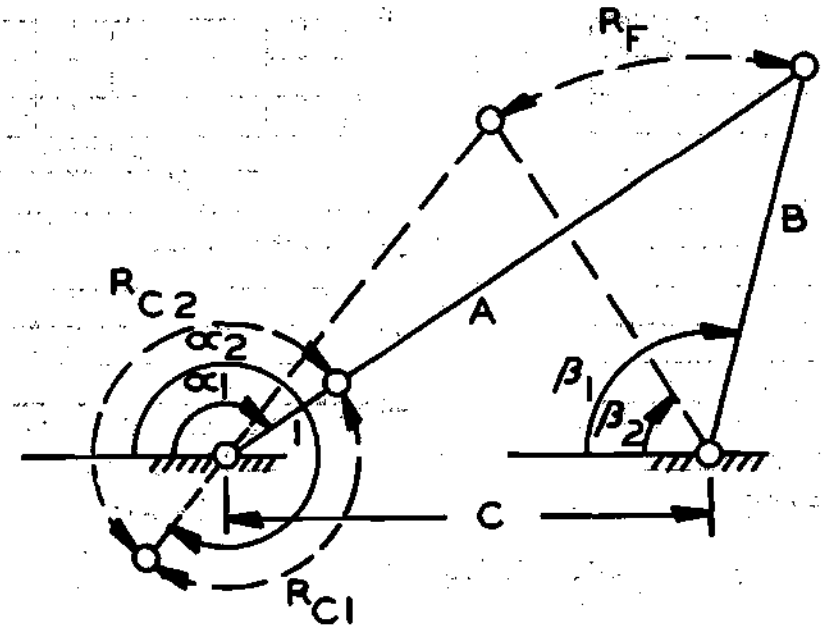
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

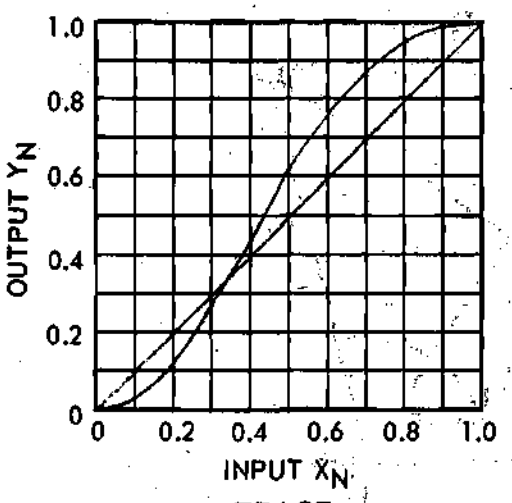
C = 3.0



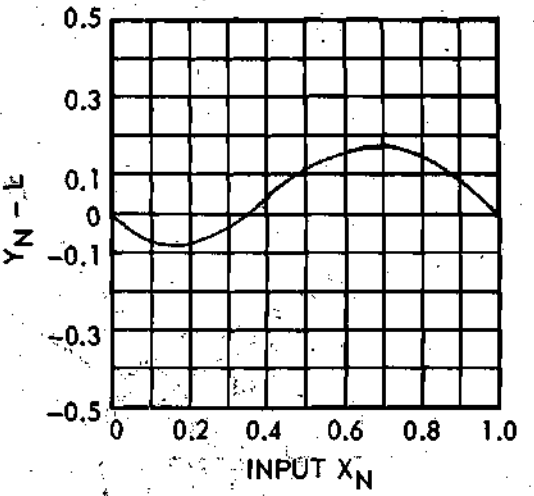
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.808577	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.474608	= 0.666031
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.029985	-0.070015	0.019123	-0.080877
0.122407	-0.077593	0.074187	-0.125813
0.268691	-0.031309	0.161988	-0.138012
0.443316	0.043316	0.278457	-0.121543
0.614675	0.114675	0.417367	-0.082633
0.759987	0.159987	0.569543	-0.030457
0.870003	0.170003	0.722445	0.022445
0.944481	0.144481	0.859721	0.059721
0.986628	0.086628	0.960573	0.060573
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

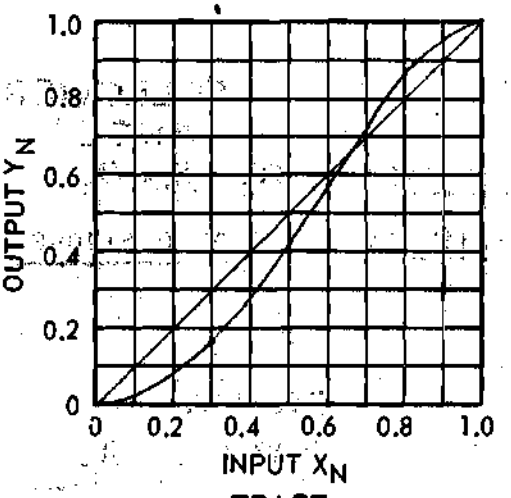


TRACE

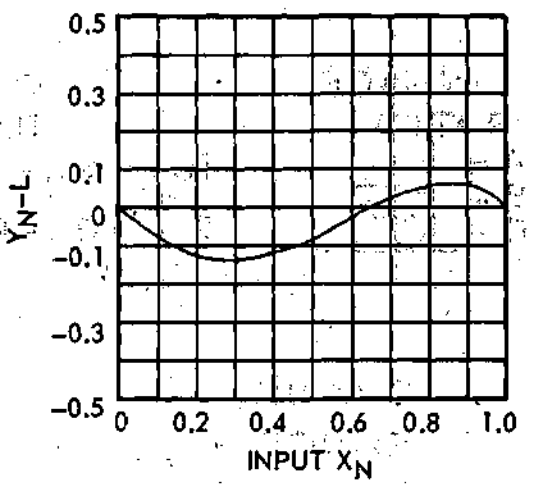


DEVIATION

CRANK RANGE RC1



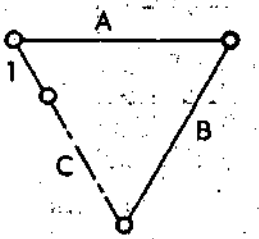
TRACE



DEVIATION

CRANK RANGE RC2

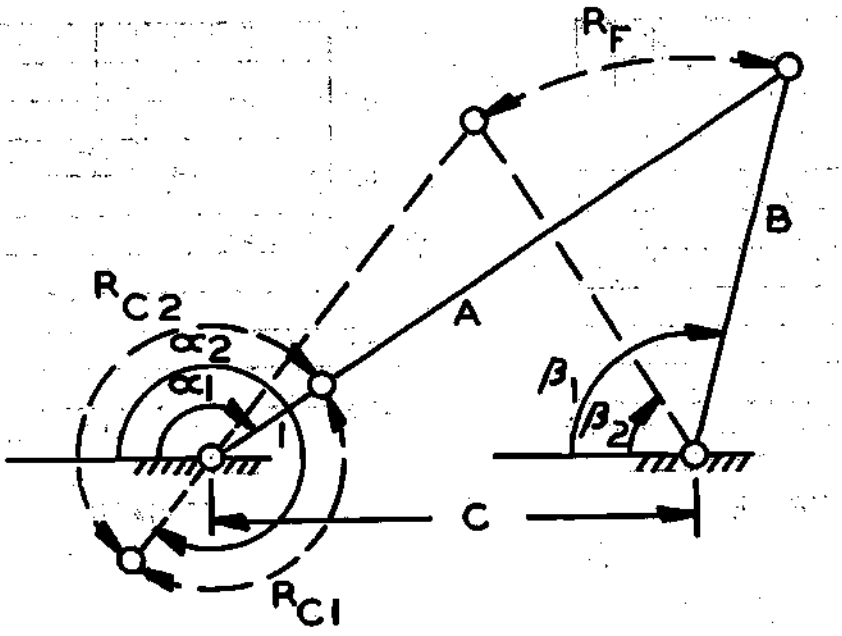
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

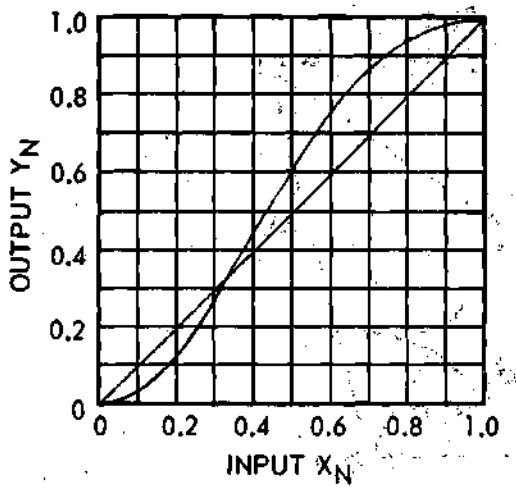
C = 3.5



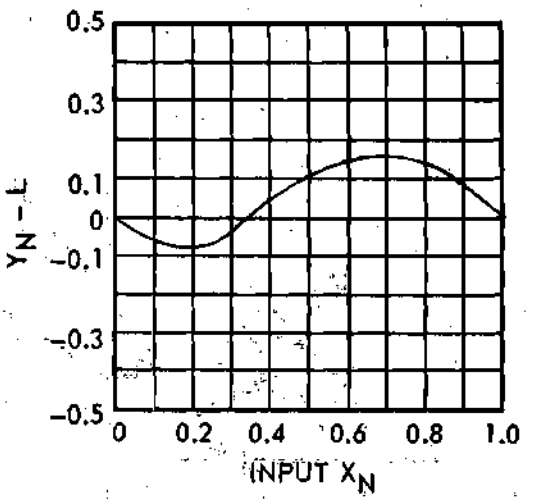
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.935464	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.347722	= 0.614098
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031395	-0.068605	0.018582	-0.081418
0.125727	-0.074273	0.073424	-0.126576
0.271140	-0.028860	0.162551	-0.137449
0.441739	0.041739	0.281929	-0.118071
0.608748	0.108748	0.424361	-0.075639
0.752110	0.152110	0.579170	-0.020830
0.863095	0.163095	0.732416	0.032416
0.940327	0.140327	0.867119	0.067119
0.985334	0.085334	0.963439	0.063439
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

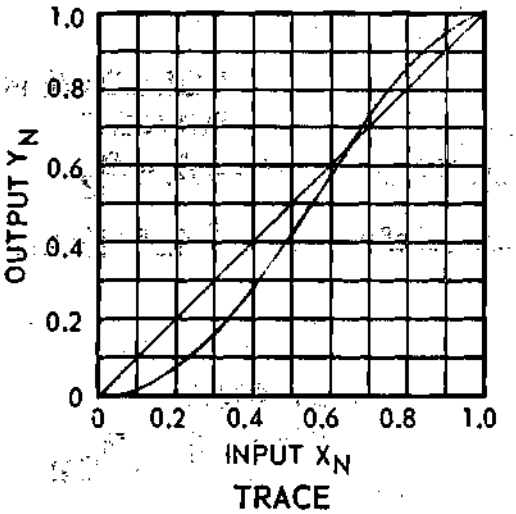


TRACE

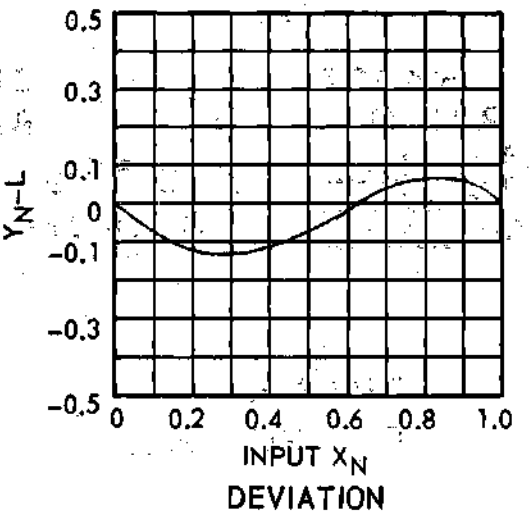


DEVIATION

CRANK RANGE RC1



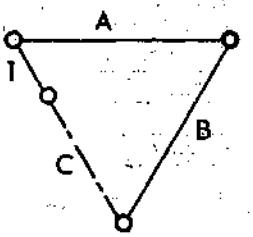
TRACE



DEVIATION

CRANK RANGE RC2

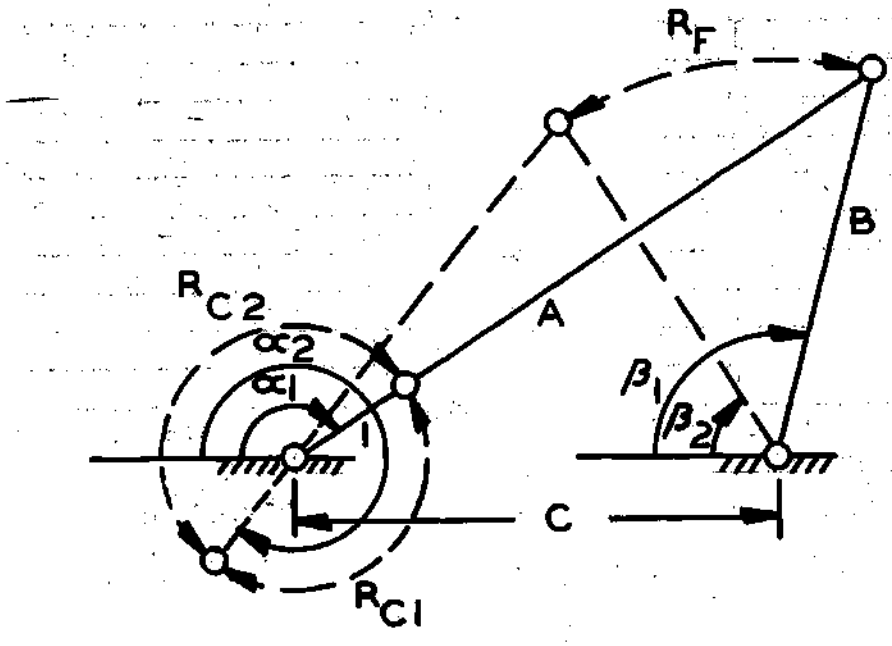
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

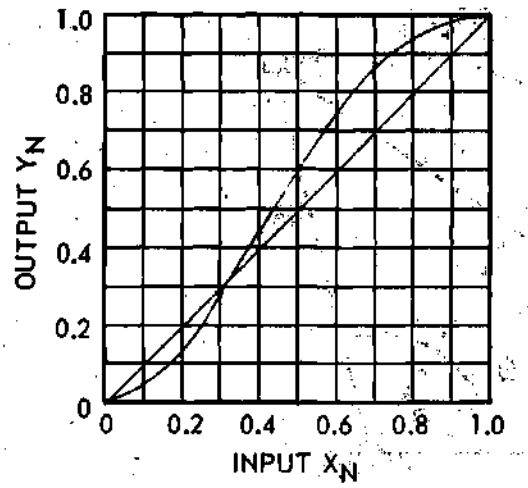
C = 4.0



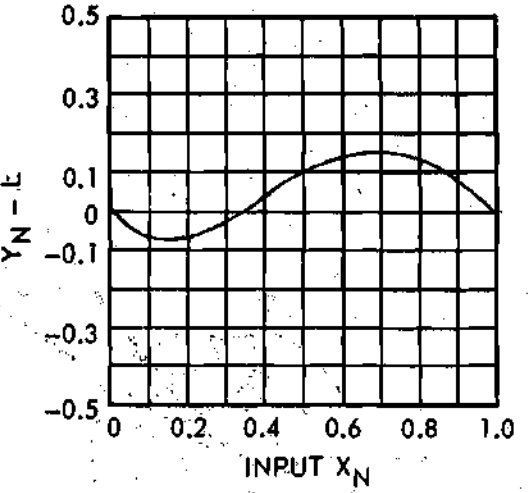
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.055500	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 4.5	$R_{C2} = 2\pi - R_{C1} =$ 3.227686	= 0.585686

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032460	-0.067540	0.018405	-0.081595
0.127851	-0.072149	0.073984	-0.126016
0.271720	-0.028280	0.165728	-0.134272
0.438282	0.038282	0.289156	-0.110844
0.601291	0.101291	0.435537	-0.064463
0.742987	0.142987	0.592418	-0.007582
0.855155	0.155155	0.744695	0.044695
0.935472	0.135472	0.875402	0.075402
0.983783	0.083783	0.966377	0.066377
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

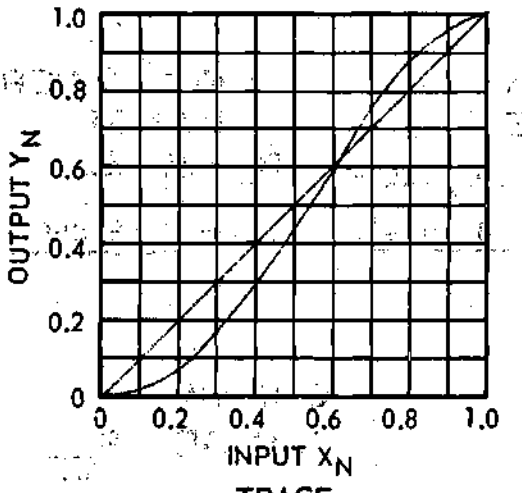


TRACE

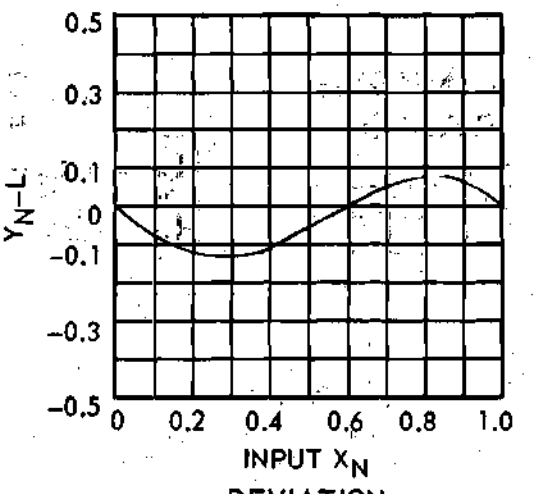


DEVIATION

CRANK RANGE RC1



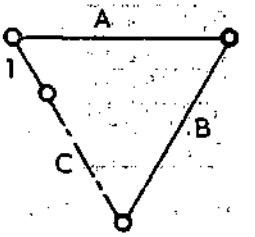
TRACE



DEVIATION

CRANK RANGE RC2

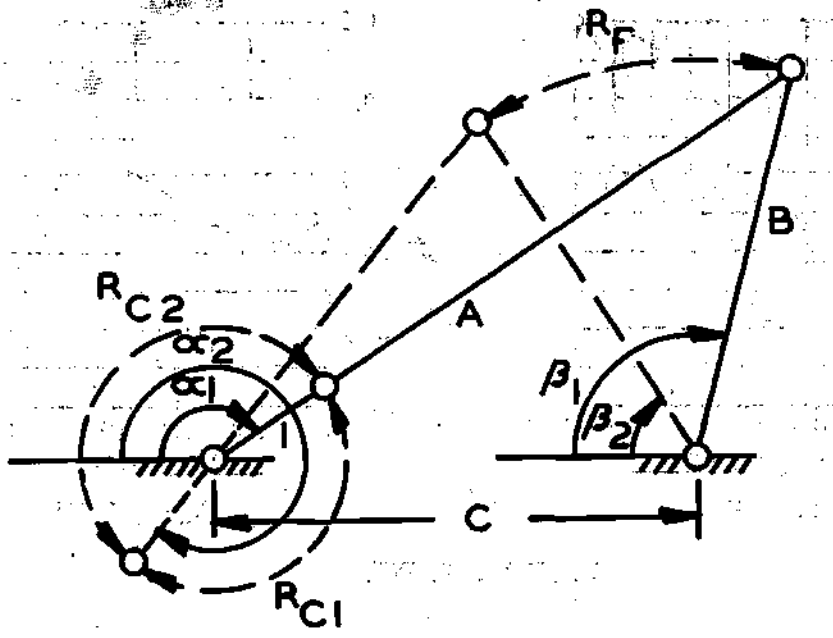
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

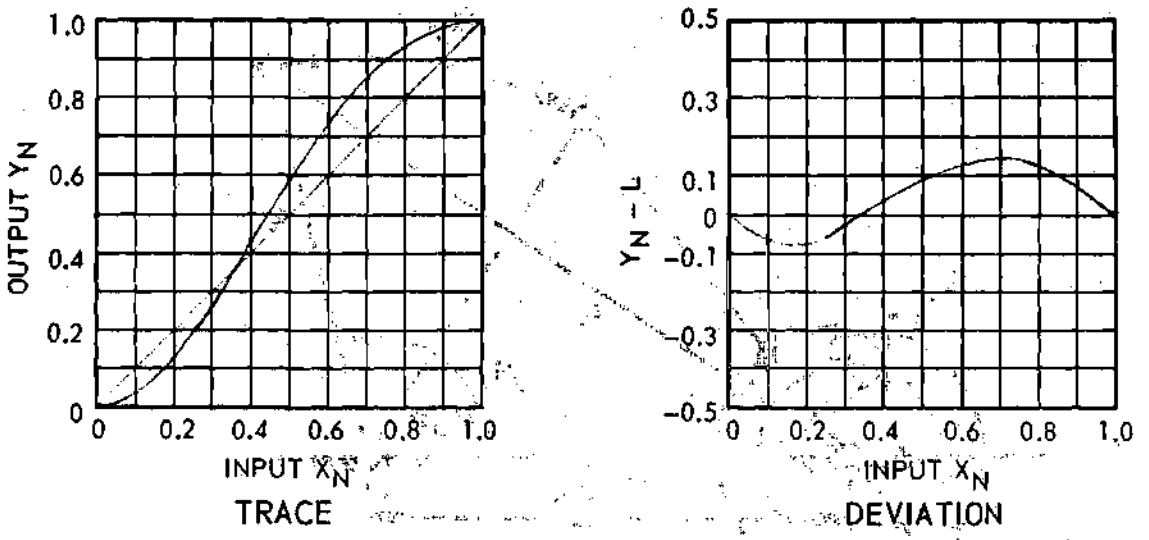
C = 4.0

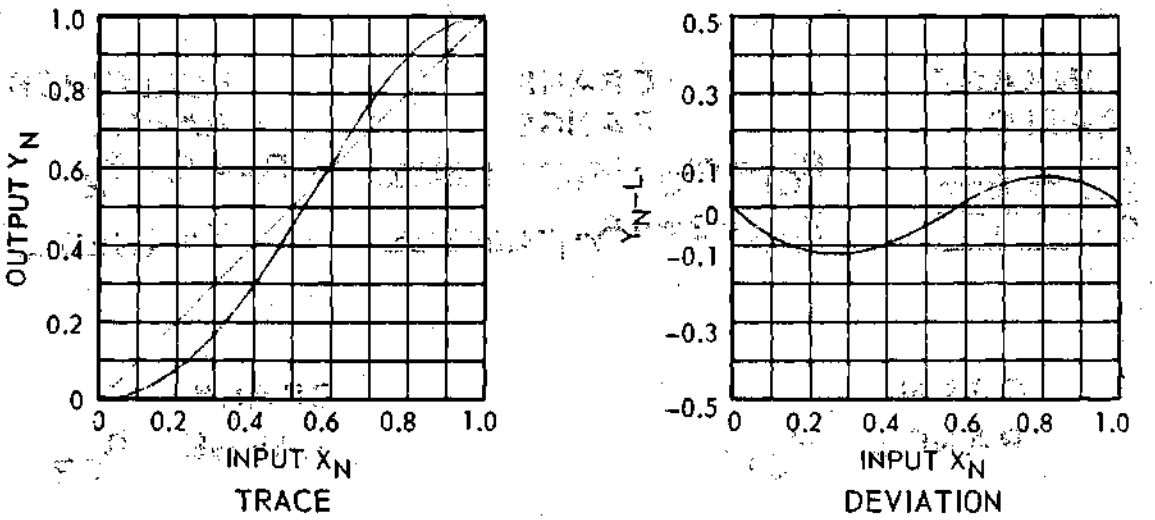


LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.181694	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.101491	= 0.580850
C = 5.0		

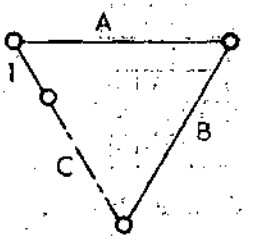
CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033156	-0.066844	0.018808	-0.081192
0.128614	-0.071386	0.076940	-0.123060
0.269855	-0.030145	0.173930	-0.126070
0.431672	0.031672	0.303677	-0.096323
0.590380	0.090380	0.454750	-0.045250
0.730443	0.130443	0.612604	0.012604
0.844269	0.144269	0.761572	0.061572
0.928668	0.128668	0.885781	0.085781
0.981539	0.081539	0.969759	0.069759
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.





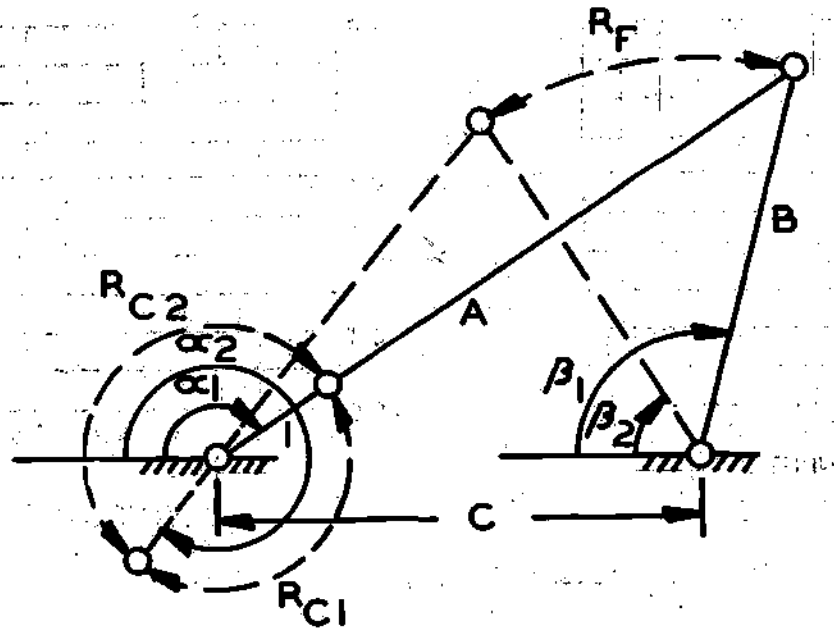
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

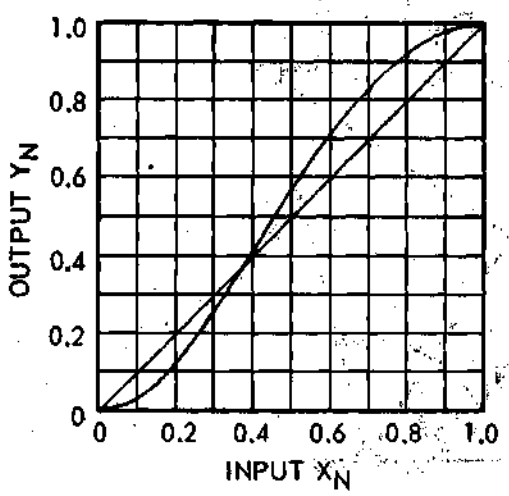
C = 5.0



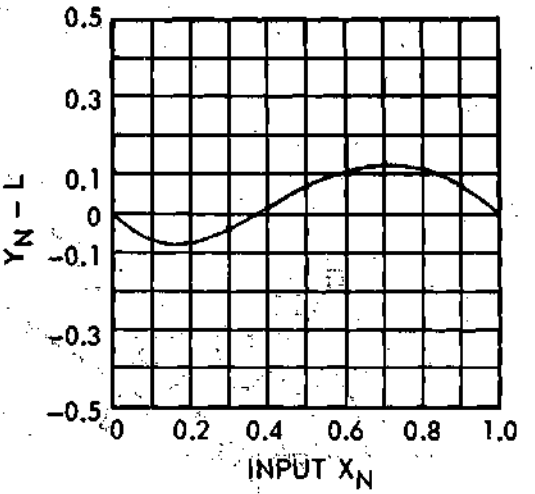
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 = 3.338170$	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 5.5	$R_{C2} = 2\pi - R_{C1} = 2.945015$	$= 0.611047$

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033254	-0.066746	0.020922	-0.079078
0.127054	-0.072946	0.087209	-0.112791
0.263321	-0.036679	0.196865	-0.103135
0.418101	0.018101	0.337952	-0.062048
0.570774	0.070774	0.493981	-0.006019
0.708493	0.108493	0.648976	0.048976
0.824795	0.124795	0.788846	0.088846
0.915886	0.115886	0.901015	0.101015
0.977051	0.077051	0.974314	0.074314
1.000000	0.000000	0.000000	0.000000

All angles measured in radians.

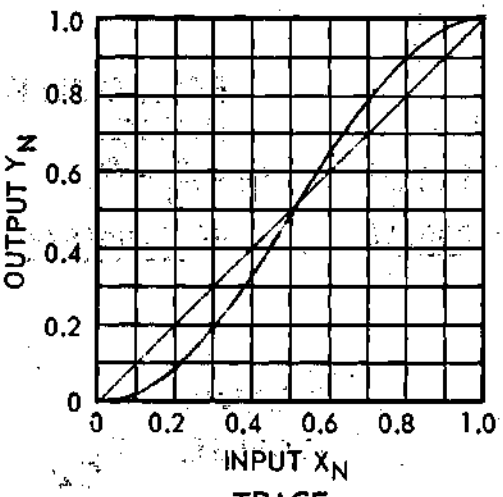


TRACE

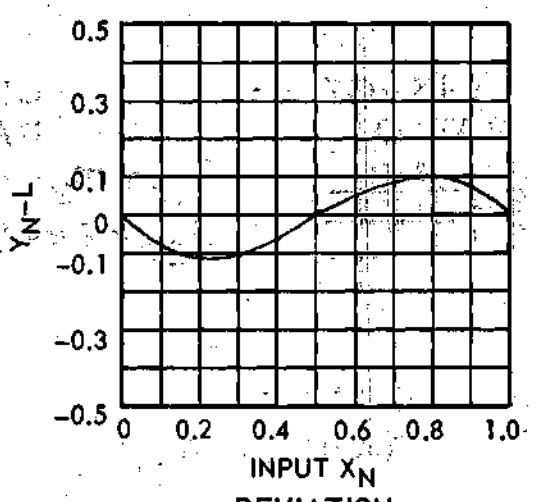


DEVIATION

CRANK RANGE RC1



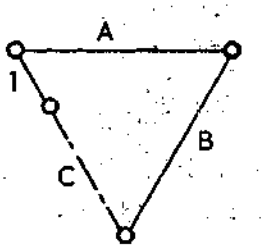
TRACE



DEVIATION

CRANK RANGE RC2

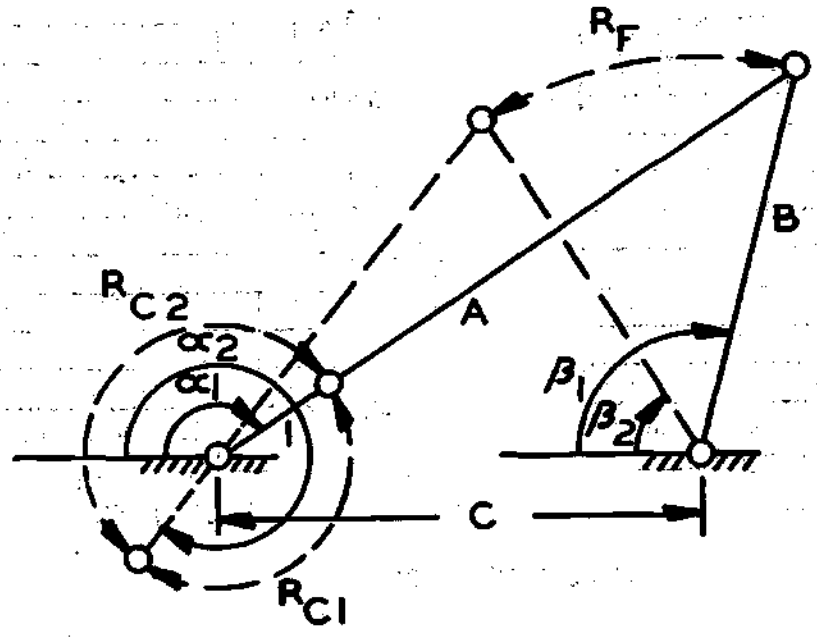
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 3.5

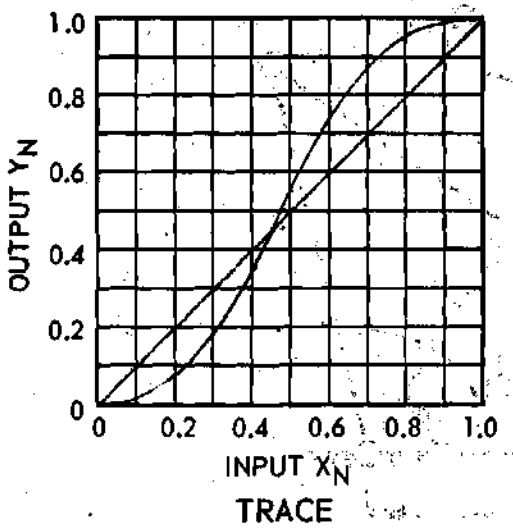
C = 5.5



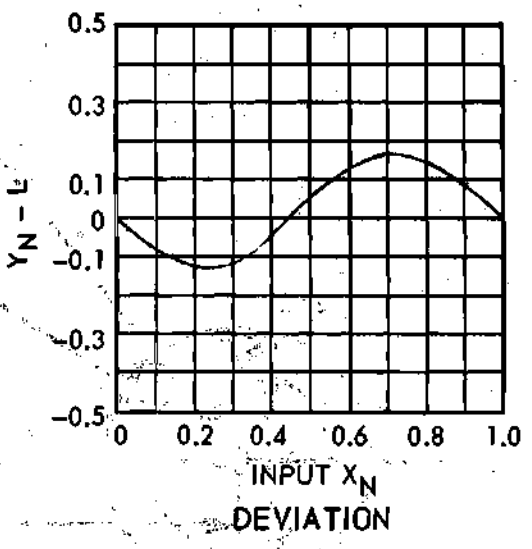
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.052869	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 4.230316	= 1.049672
C = 2.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.016360	-0.083640	0.029383	-0.070617
0.073623	-0.126377	0.098064	-0.101936
0.184046	-0.115954	0.191438	-0.108562
0.351503	-0.048497	0.303367	-0.096633
0.553926	0.053926	0.430002	-0.069998
0.741326	0.141326	0.567068	-0.032932
0.875040	0.175040	0.708076	0.008076
0.952913	0.152912	0.842322	0.042322
0.989926	0.089926	0.951216	0.051216
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

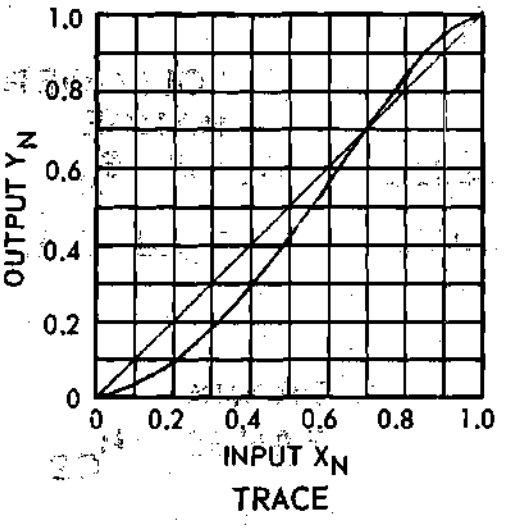


TRACE

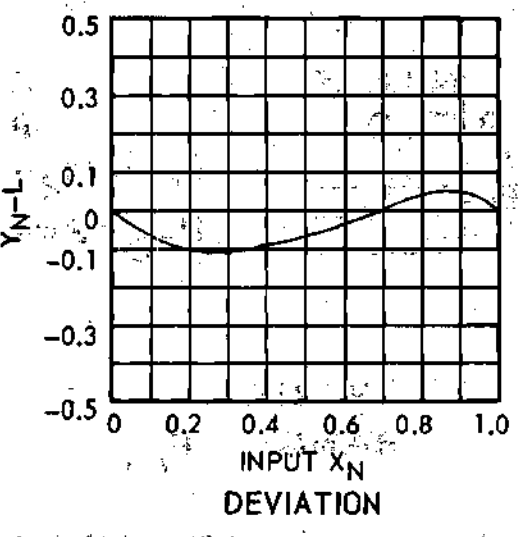


DEVIATION

CRANK RANGE RC1



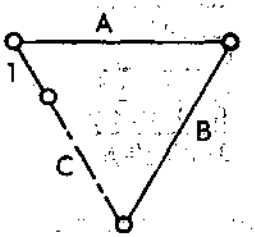
TRACE



DEVIATION

CRANK RANGE RC2

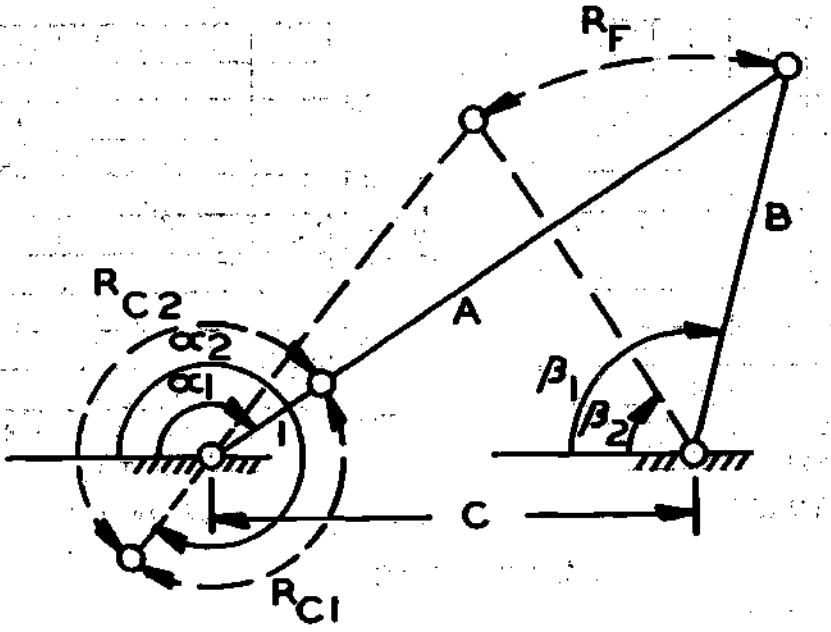
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

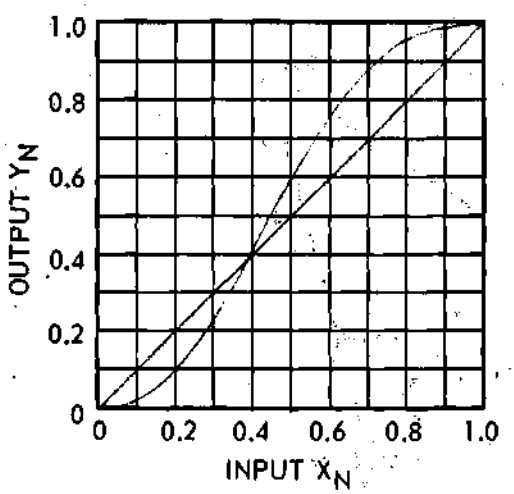
C = 2.0



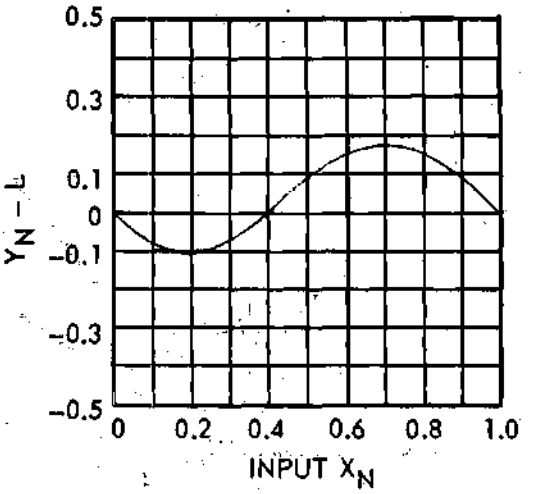
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.372280	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.827128
C = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.910905	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.021819	-0.078181	0.024030	-0.075970
0.094821	-0.105179	0.086005	-0.113995
0.224963	-0.075037	0.176447	-0.123553
0.401581	0.001581	0.289727	-0.110273
0.591724	0.091724	0.421018	-0.078982
0.756651	0.156651	0.564334	-0.035666
0.876125	0.176125	0.710986	0.010986
0.950568	0.150568	0.847868	0.047868
0.988863	0.088863	0.954769	0.054769
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

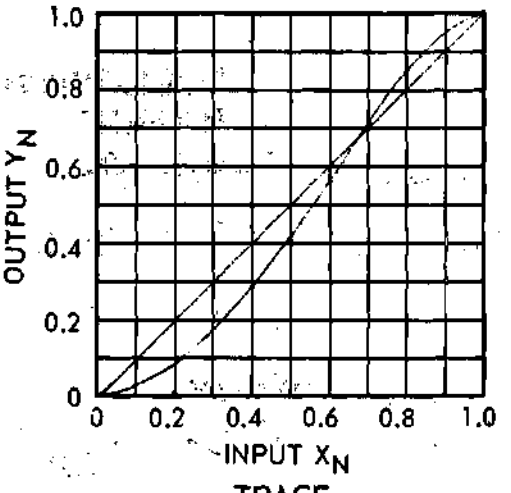


TRACE

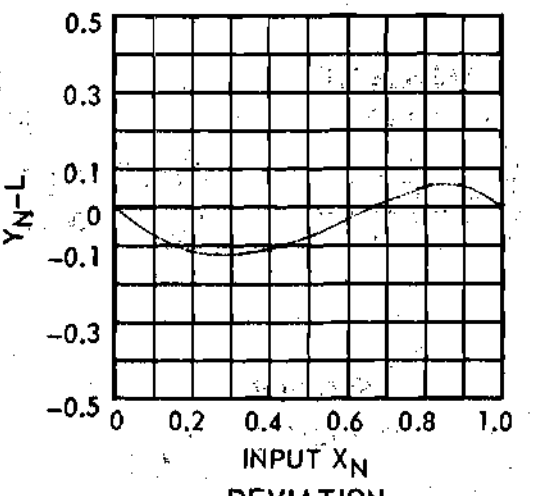


DEVIATION

CRANK RANGE RC1



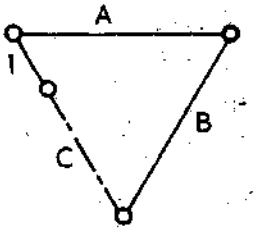
TRACE



DEVIATION

CRANK RANGE RC2

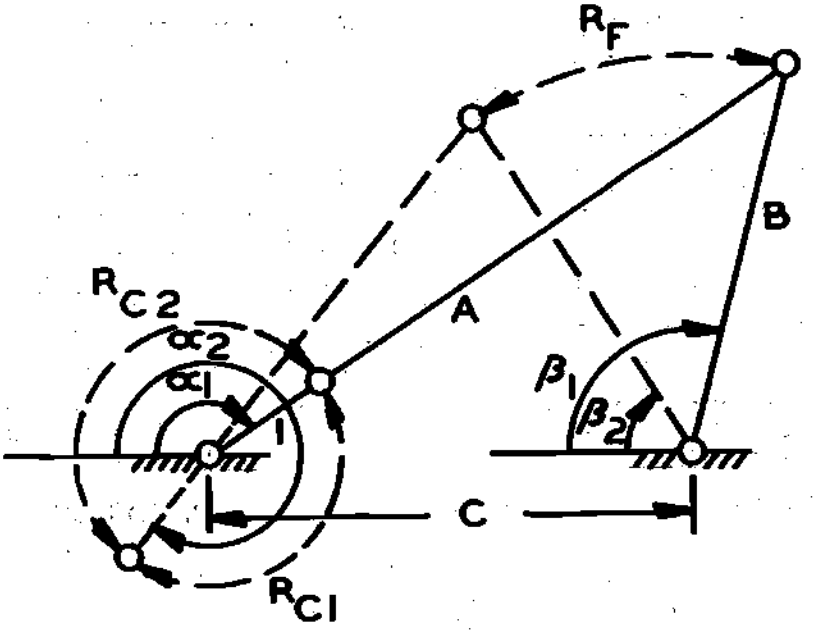
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

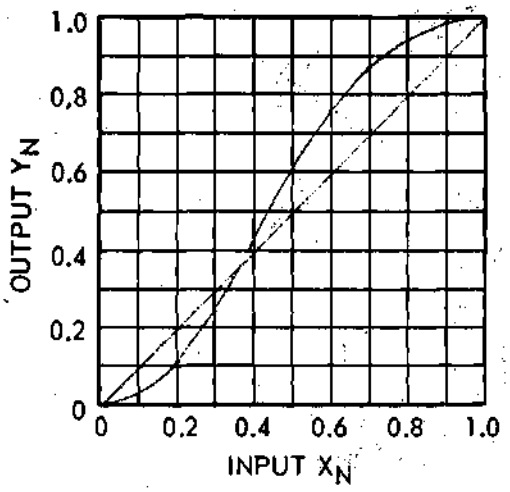
C = 2.5



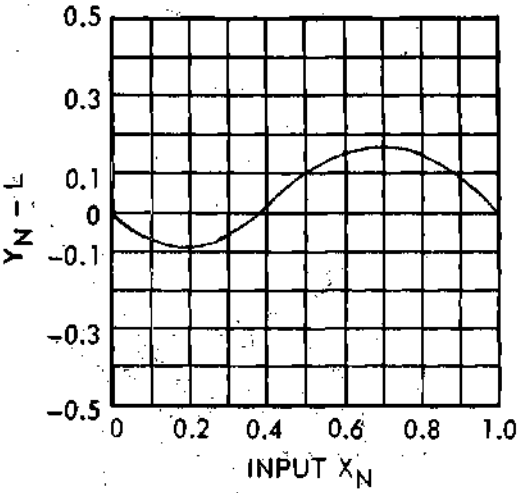
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.578632	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.697434
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.704553	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.025331	-0.074669	0.021514	-0.078486
0.106913	-0.093087	0.079990	-0.120010
0.244558	-0.055442	0.168940	-0.131060
0.420433	0.020433	0.283433	-0.116567
0.601611	0.101611	0.418113	-0.081887
0.757256	0.157256	0.565685	-0.034315
0.872663	0.172663	0.715703	0.015703
0.947559	0.147559	0.853317	0.053317
0.987829	0.087829	0.957628	0.057628
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

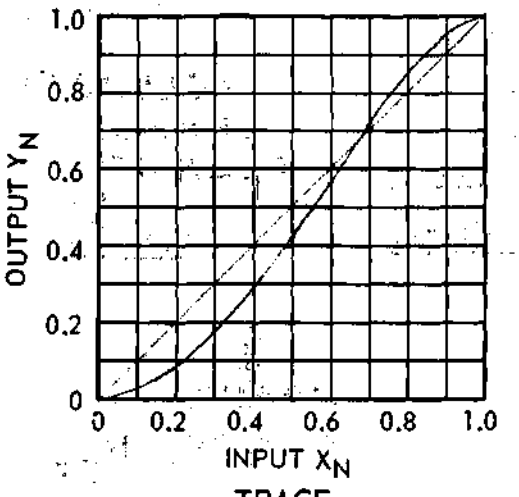


TRACE

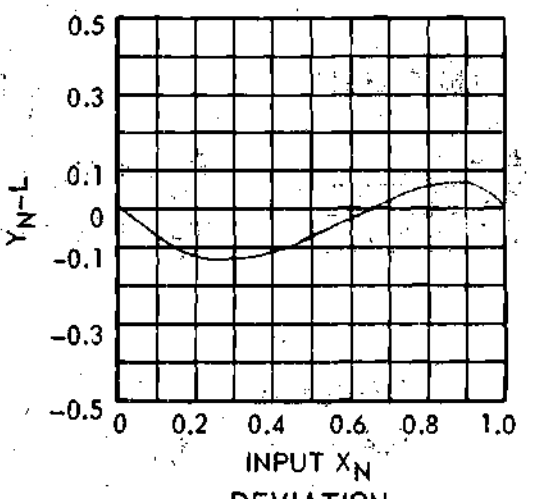


DEVIATION

CRANK RANGE RG2



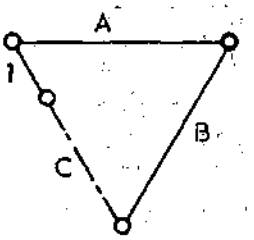
TRACE



DEVIATION

CRANK RANGE RG2

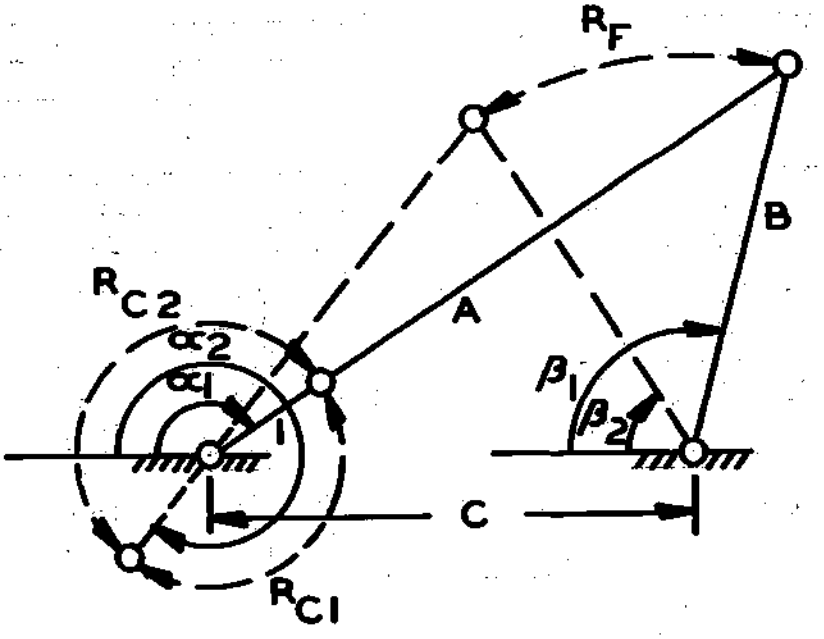
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

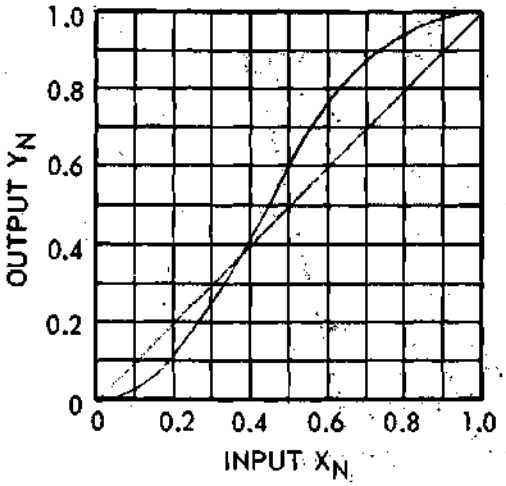
C = 3.0



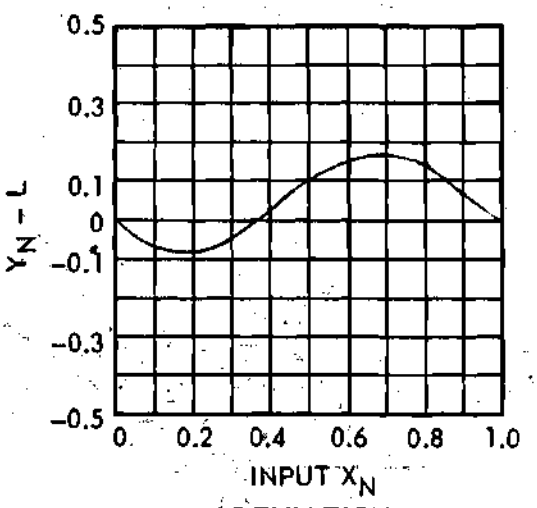
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 = 2.733623$	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} = 3.549562$	$= 0.614098$
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027833	-0.072167	0.020035	-0.079965
0.114747	-0.085253	0.076464	-0.123536
0.255694	-0.044306	0.164839	-0.135161
0.429229	0.029229	0.280788	-0.119212
0.604193	0.104193	0.418466	-0.081534
0.754659	0.154659	0.569365	-0.030635
0.868465	0.168465	0.721501	0.021501
0.944566	0.144566	0.858739	0.058739
0.986842	0.086842	0.960119	0.060119
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

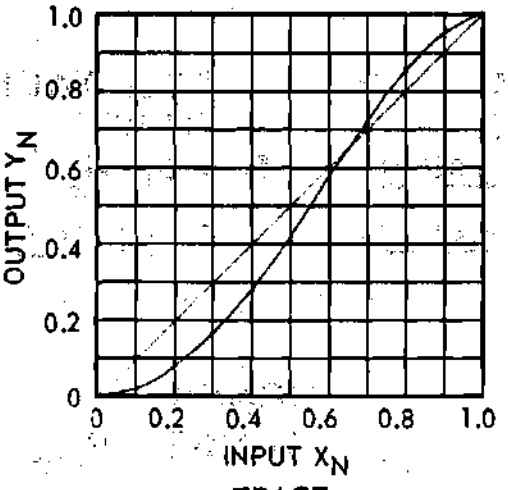


TRACE

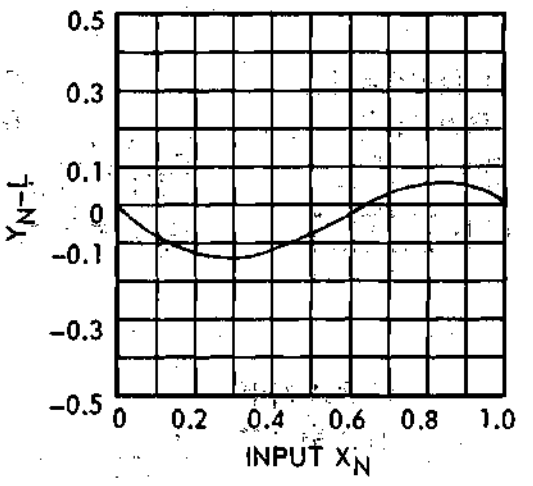


DEVIATION

CRANK RANGE RC1



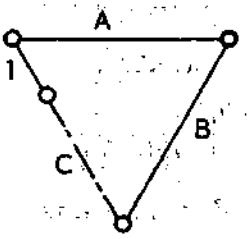
TRACE



DEVIATION

CRANK RANGE RC2

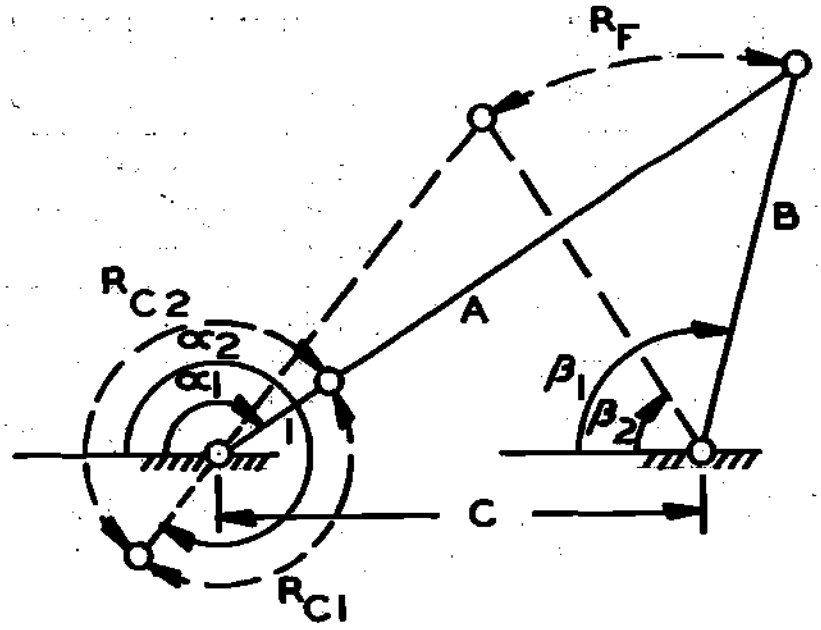
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

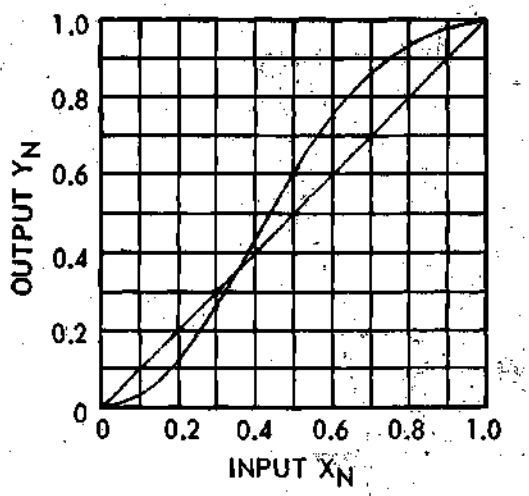
C = 3.5



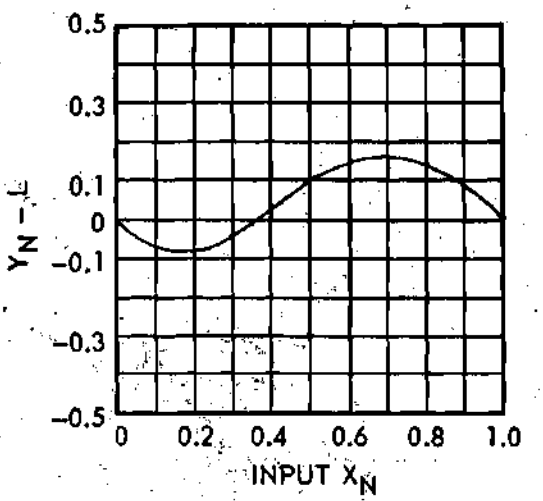
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.862010	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.559165
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.421175	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.029719	-0.070281	0.019098	-0.080902
0.120170	-0.079830	0.074397	-0.125603
0.262483	-0.037517	0.162982	-0.137018
0.433322	0.033322	0.280839	-0.119161
0.603533	0.103533	0.421496	-0.078504
0.750584	0.150584	0.575175	-0.024825
0.863805	0.163805	0.728490	0.028490
0.941460	0.141460	0.864415	0.064415
0.985829	0.085829	0.962464	0.062464
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

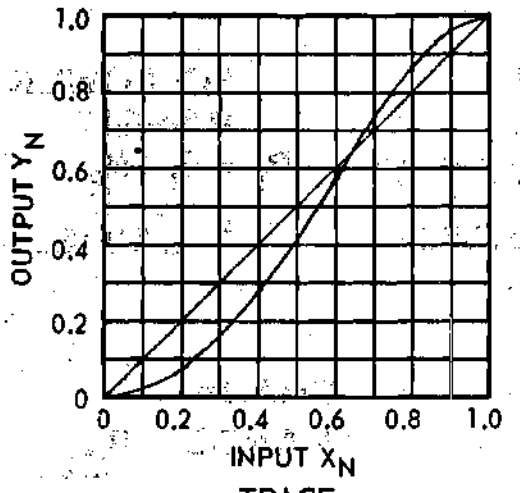


TRACE

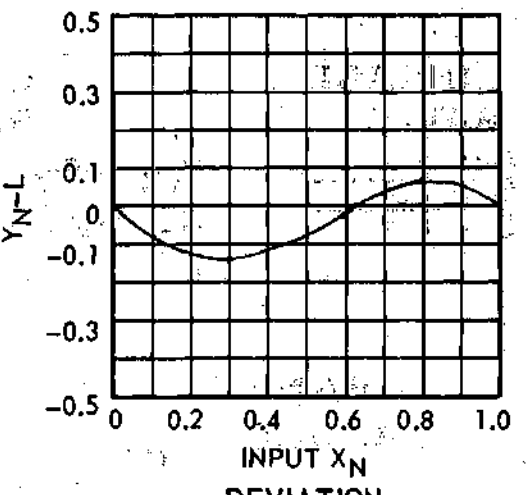


DEVIATION

CRANK RANGE RC1



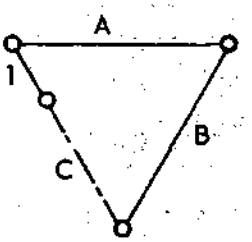
TRACE



DEVIATION

CRANK RANGE RC2

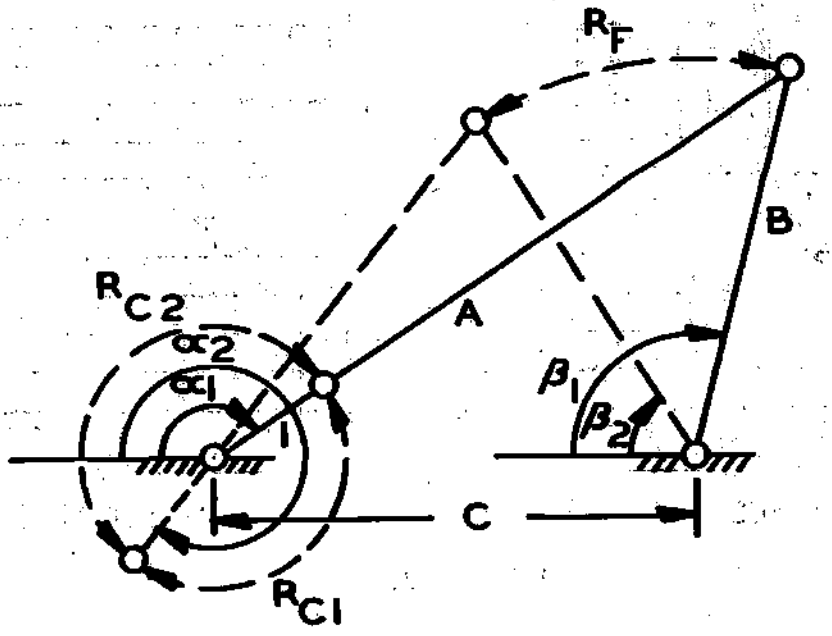
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

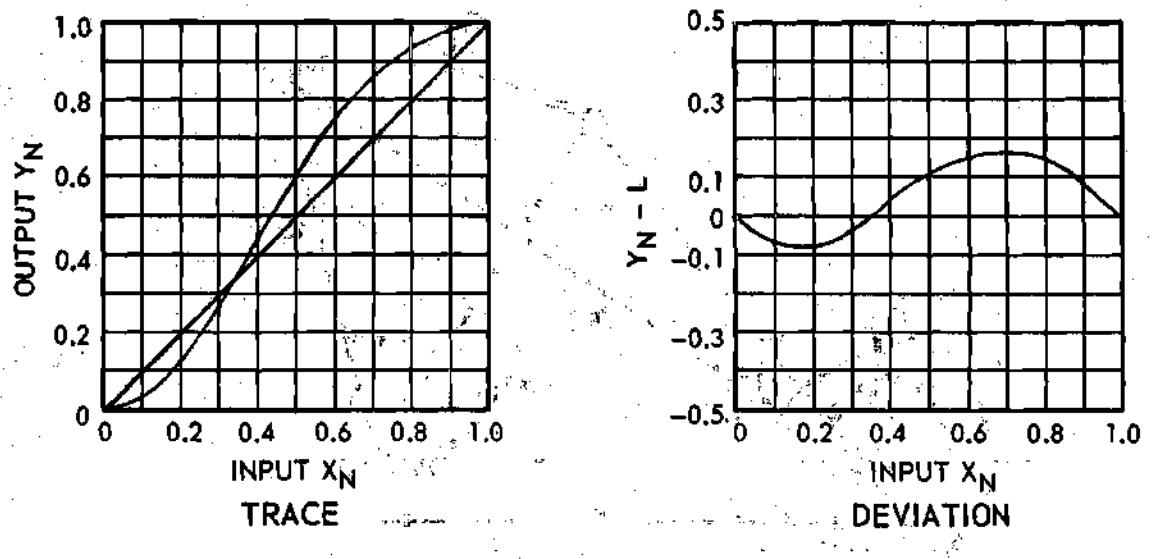
C = 4.0



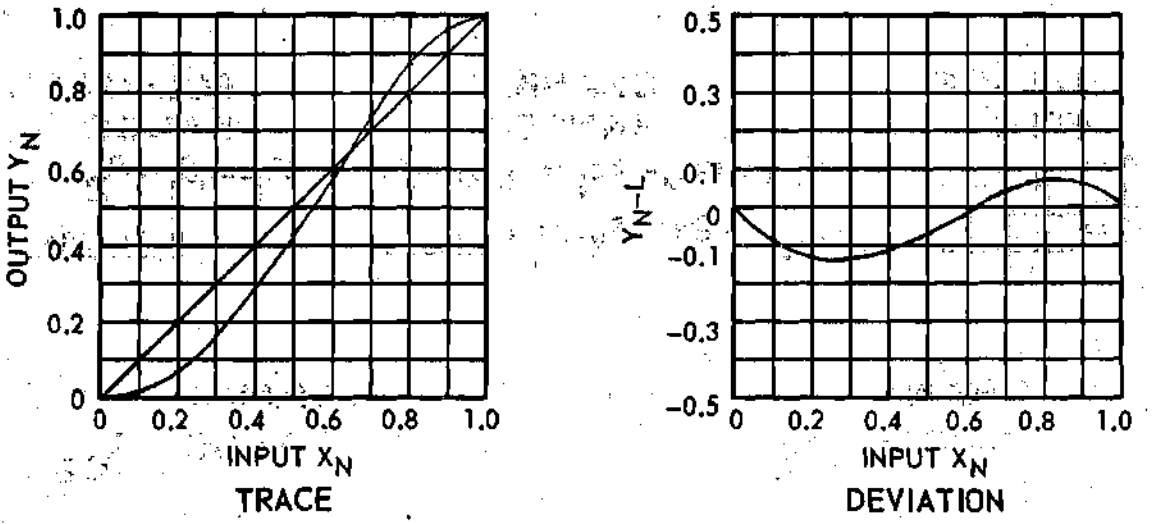
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.977422	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.305763	= 0.524557
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031178	-0.068822	0.018536	-0.081464
0.123981	-0.076019	0.073498	-0.126502
0.266473	-0.033527	0.163195	-0.136805
0.434391	0.034391	0.283692	-0.116308
0.600576	0.100576	0.427582	0.072418
0.745114	0.145114	0.583634	-0.016366
0.858366	0.158366	0.737175	0.037175
0.937950	0.137950	0.870731	0.070731
0.984684	0.084684	0.964842	0.064842
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

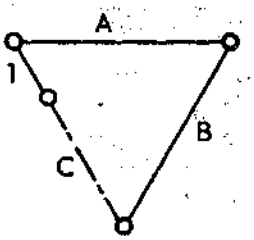


CRANK RANGE RC1



CRANK RANGE RC2

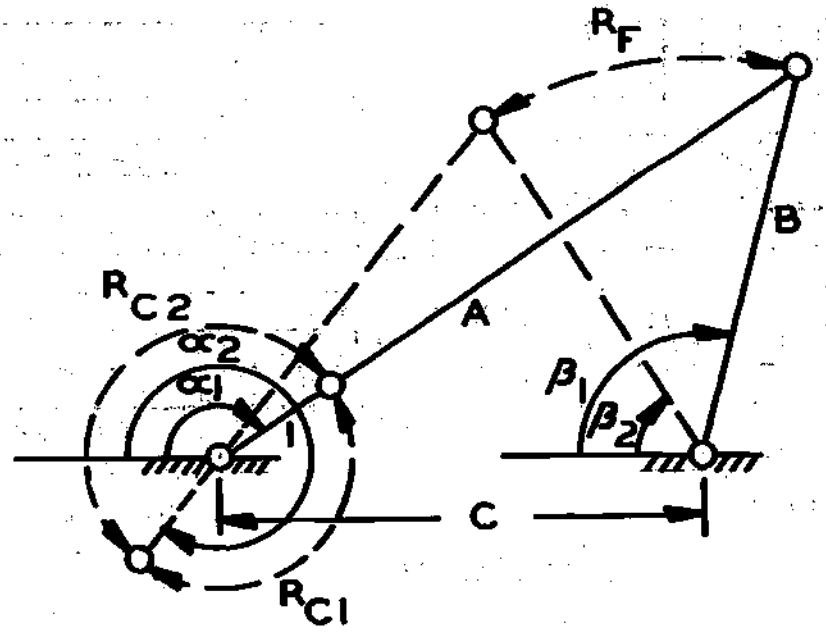
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

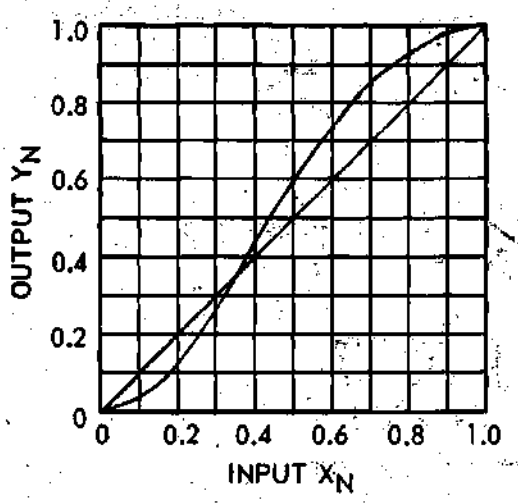
C = 4.5



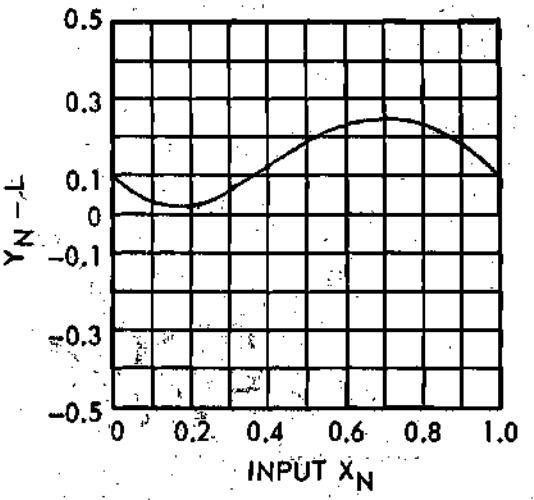
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.090069	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.193116	= 0.507284
C = 5.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032288	-0.067712	0.018340	-0.081660
0.126474	-0.073526	0.073952	-0.126048
0.268126	-0.031874	0.166124	-0.133876
0.432701	0.032701	0.290508	-0.109492
0.595075	0.095075	0.438167	-0.061833
0.737580	0.137580	0.596110	-0.003890
0.851402	0.151402	0.748582	0.048582
0.933521	0.133521	0.878274	0.078274
0.983228	0.083228	0.967454	0.067454
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

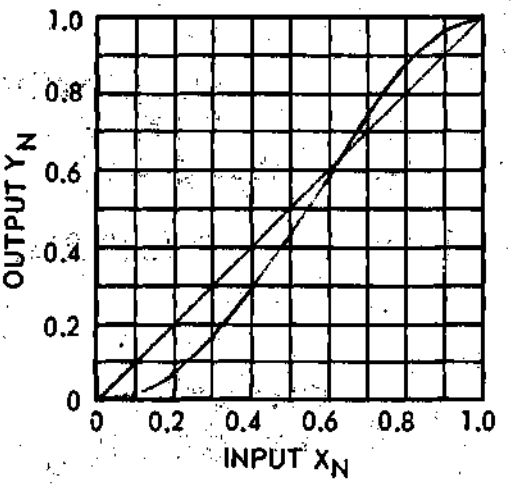


TRACE

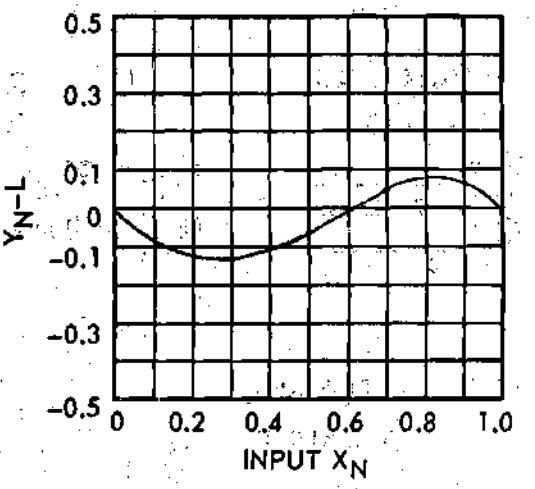


DEVIATION

CRANK RANGE RC1



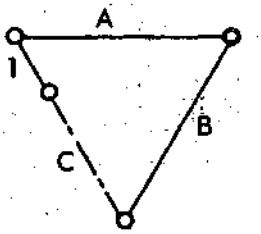
TRACE



DEVIATION

CRANK RANGE RC2

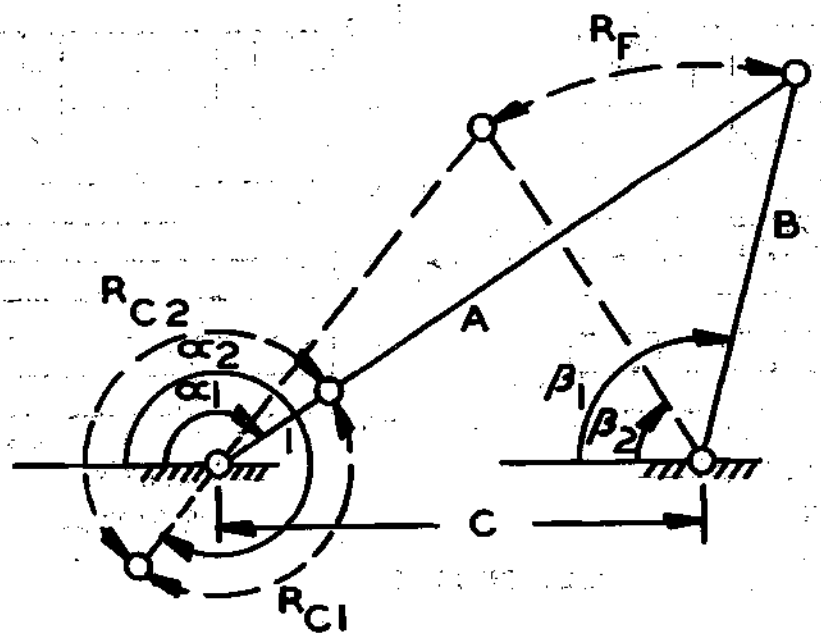
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

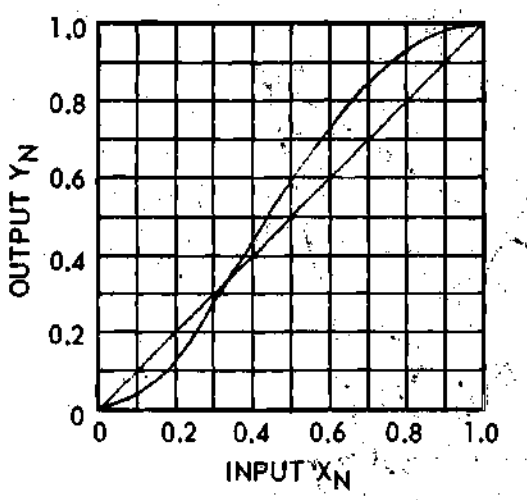
C = 5.0



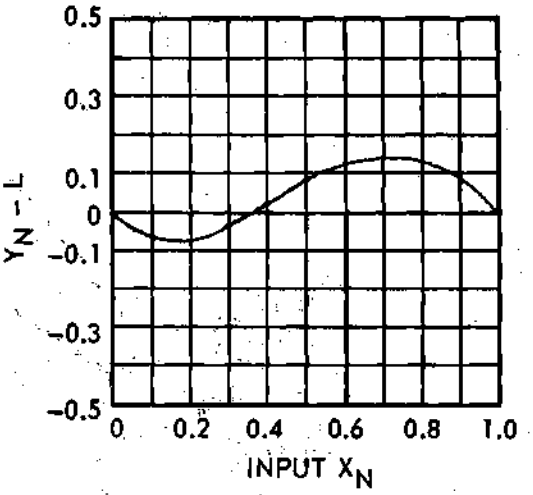
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.211646	$R_F = \beta_1 - \beta_2$
B = 4.0		
C = 5.5	$R_{C2} = 2\pi - R_{C1} =$ 3.071539	= 0.508911

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033024	-0.066976	0.018717	-0.081283
0.127530	-0.072470	0.076806	-0.123194
0.267054	-0.032946	0.174147	-0.125853
0.427354	0.027354	0.304792	-0.095208
0.585539	0.085539	0.457059	-0.042941
0.726144	0.126144	0.615832	0.015832
0.841185	0.141185	0.764877	0.064877
0.926995	0.126995	0.888132	0.088132
0.981038	0.081038	0.970605	0.070605
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

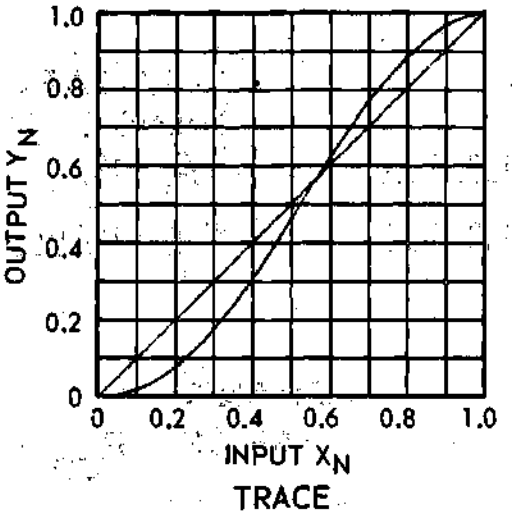


TRACE

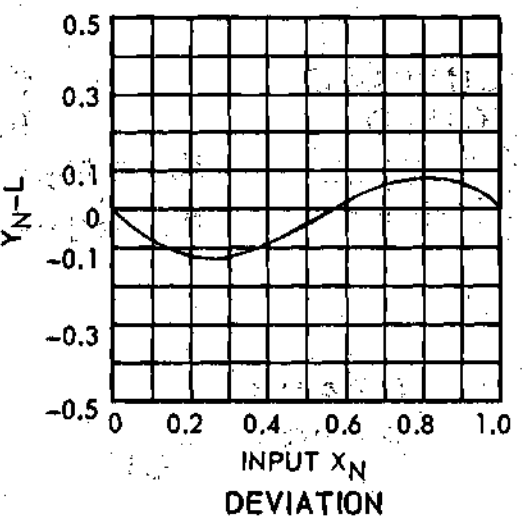


DEVIATION

CRANK RANGE RC1



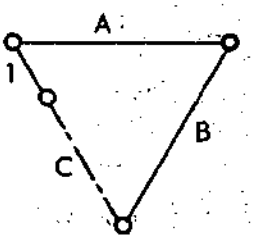
TRACE



DEVIATION

CRANK RANGE RC2

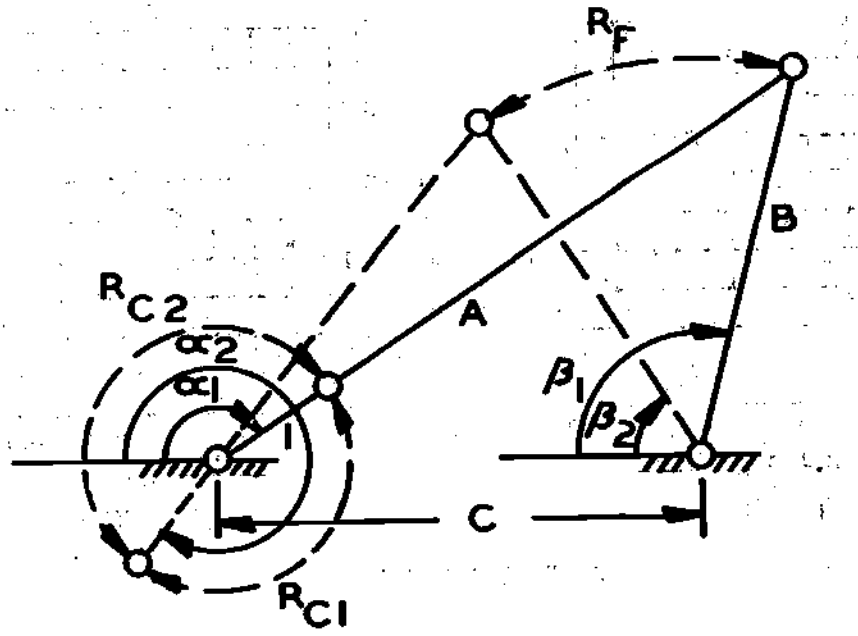
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

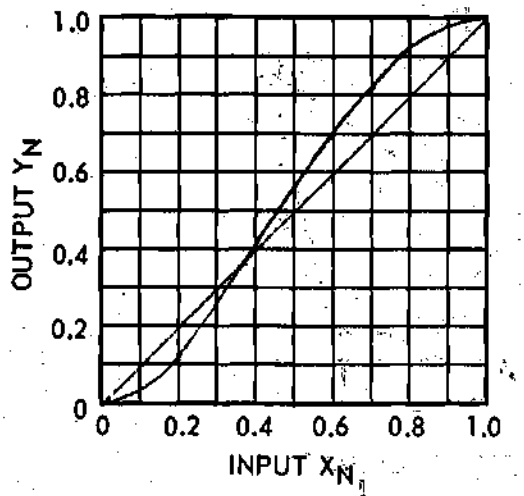
C = 5.5



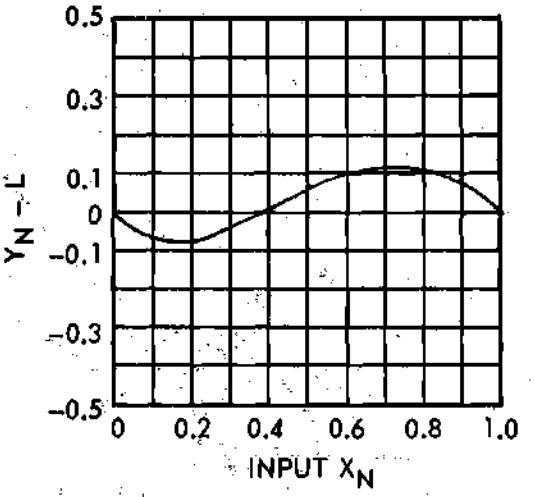
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 3.5	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.365938	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 2.917247	= 0.540640
C = 6.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033164	-0.066836	0.020783	-0.079217
0.126222	-0.073778	0.086958	-0.113042
0.261163	-0.038837	0.197030	-0.102970
0.414770	0.014770	0.339149	-0.060851
0.566990	0.066990	0.496366	-0.003634
0.705030	0.105030	0.652087	0.052087
0.822186	0.122186	0.791817	0.091817
0.914367	0.114367	0.902999	0.102999
0.976553	0.076553	0.974989	0.074989
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

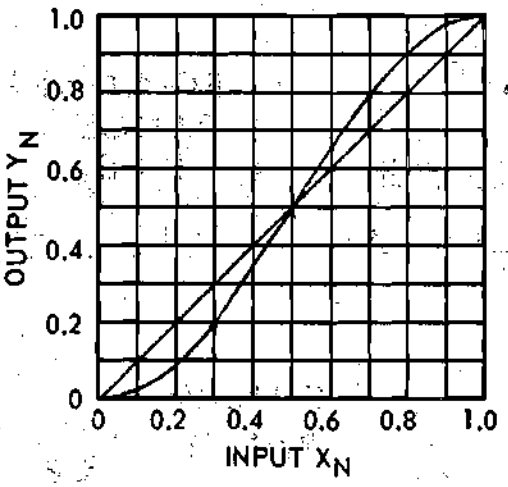


TRACE

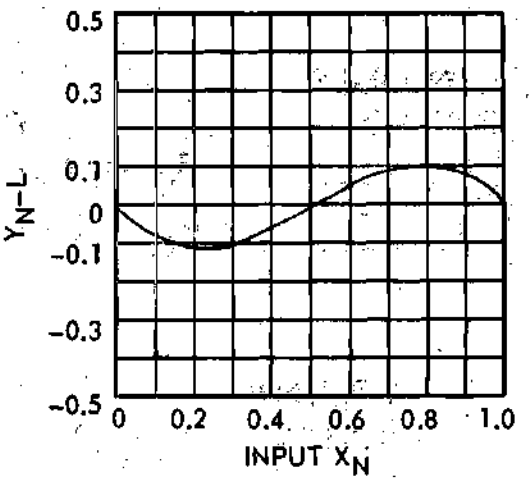


DEVIATION

CRANK RANGE RC1



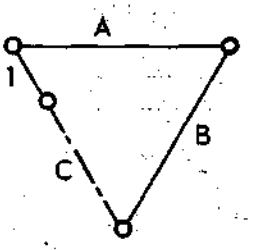
TRACE



DEVIATION

CRANK RANGE RC2

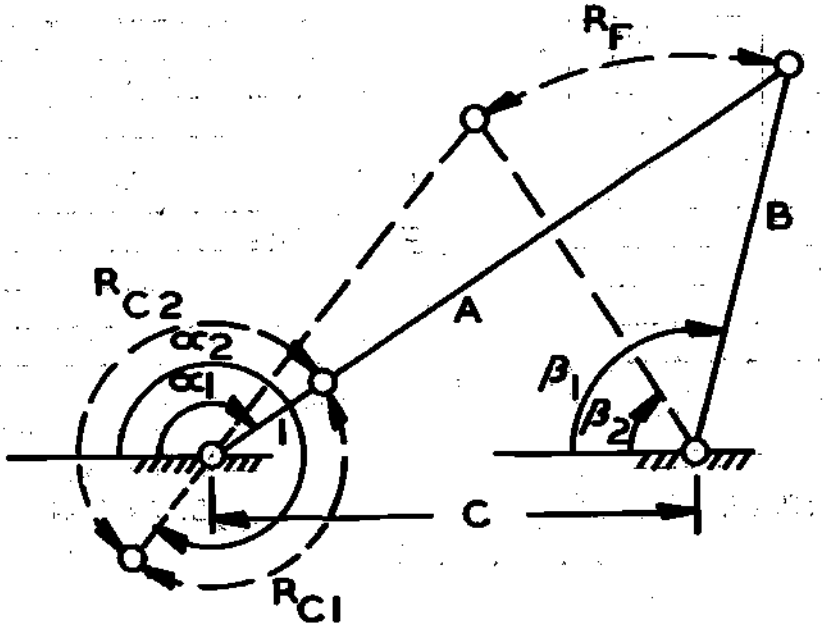
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 3.5

B = 4.0

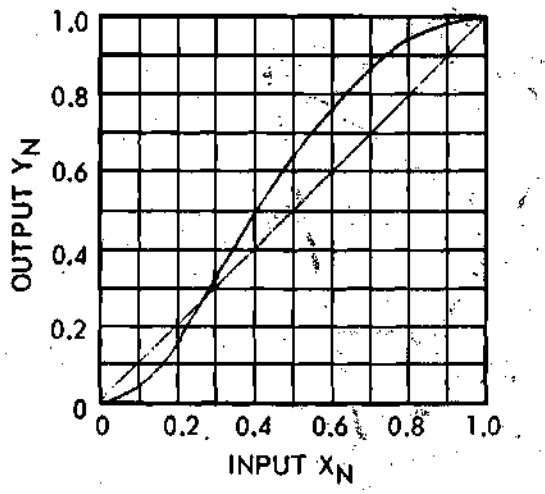
C = 6.0



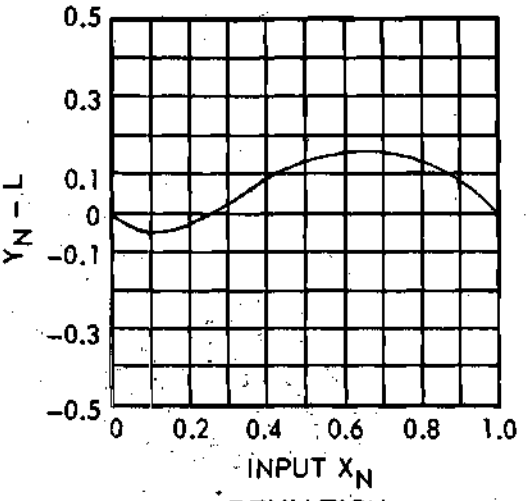
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.068082	$R_F = \beta_1 - \beta_2$
B = 1.5	$R_{C2} = 2\pi - R_{C1} =$ 3.215103	= 1.477555
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.042098	-0.057902	0.021358	-0.078642
0.161282	-0.038718	0.085620	-0.114380
0.321825	0.021825	0.186385	-0.113615
0.485761	0.085761	0.312241	-0.087759
0.633029	0.133029	0.452125	-0.047875
0.757197	0.157197	0.596873	-0.003127
0.857333	0.157333	0.737927	0.037927
0.933083	0.133083	0.864739	0.064739
0.982247	0.082247	0.960860	0.060860
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

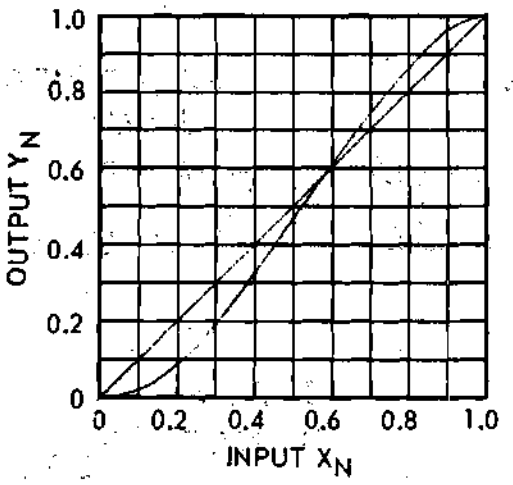


TRACE

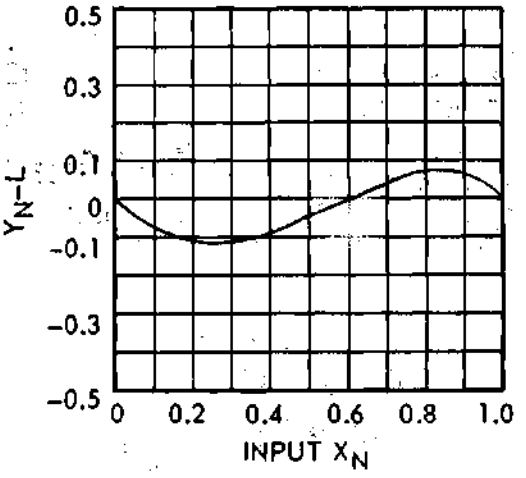


DEVIATION

CRANK RANGE RC1



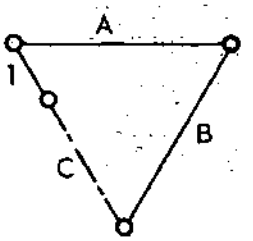
TRACE



DEVIATION

CRANK RANGE RC2

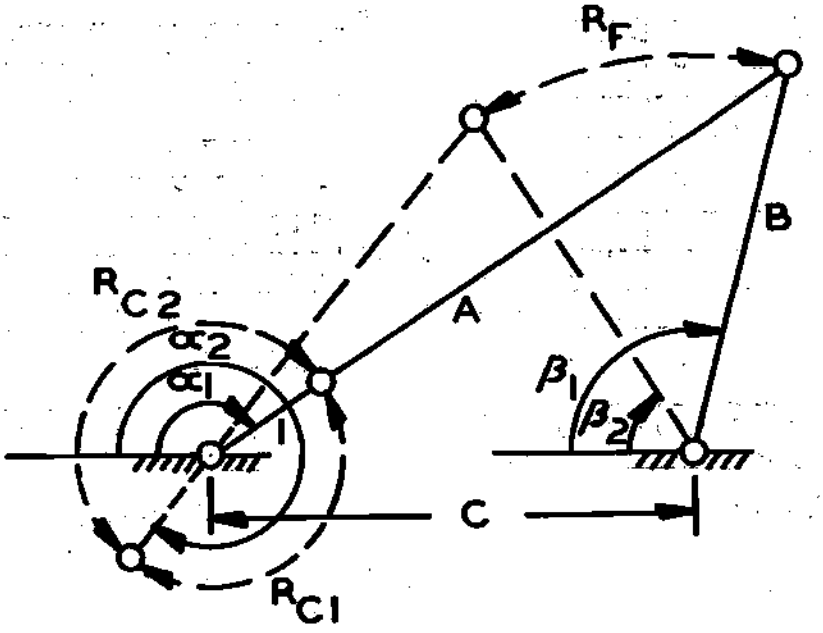
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

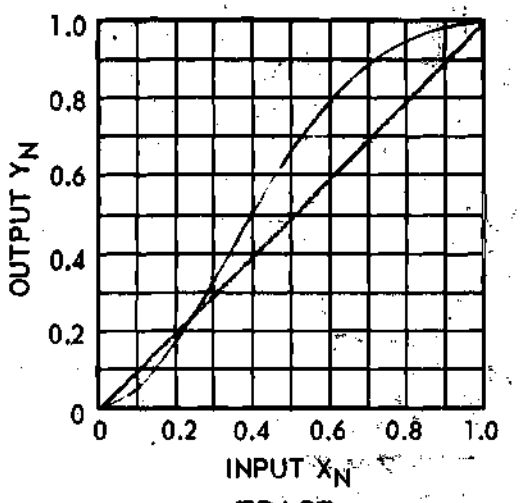
B = 1.5

C = 4.0

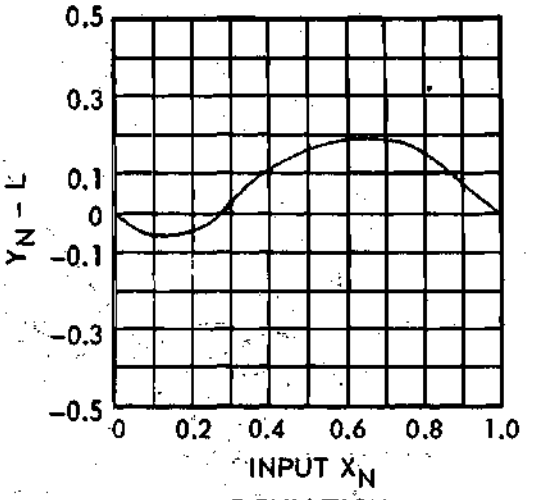


LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.852268	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.430917	= 1.219476
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.041208	-0.058792	0.018023	-0.081977
0.163561	-0.036439	0.071288	-0.128712
0.335041	0.035041	0.157173	-0.142827
0.511550	0.111550	0.270719	-0.129281
0.666407	0.166407	0.405010	-0.094990
0.790760	0.190760	0.551858	-0.048142
0.884326	0.184326	0.701725	0.001725
0.949223	0.149223	0.842025	0.042025
0.987404	0.087404	0.952829	0.052829
1.000000	0.000000	1.000000	0.000000

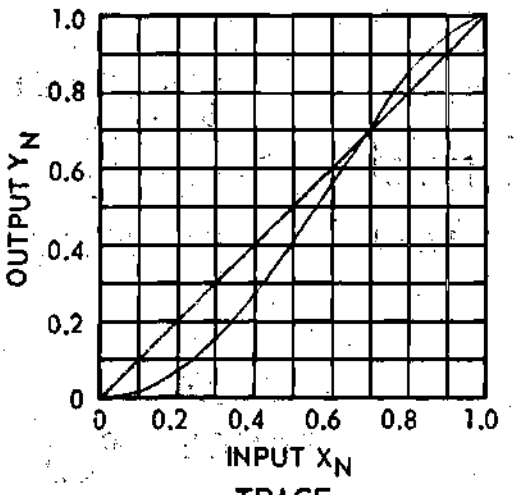


TRACE

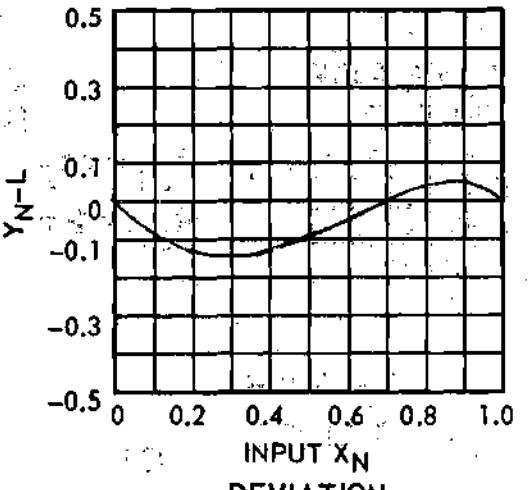


DEVIATION

CRANK RANGE RC1



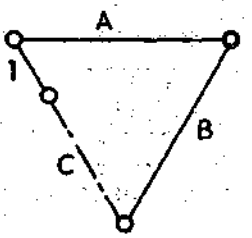
TRACE



DEVIATION

CRANK RANGE RC2

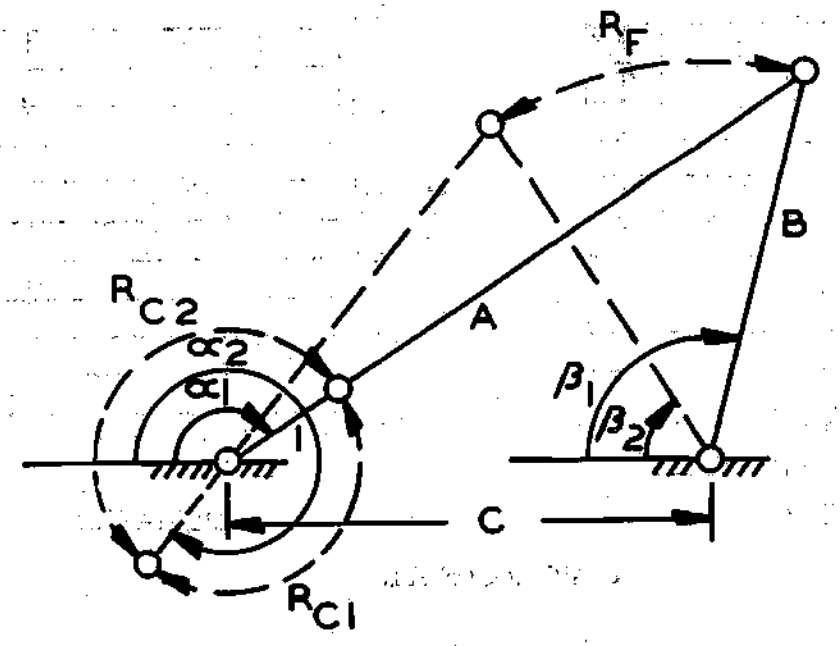
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.0

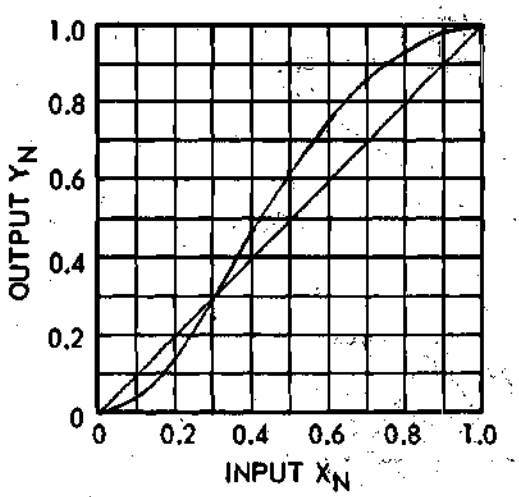
C = 3.5



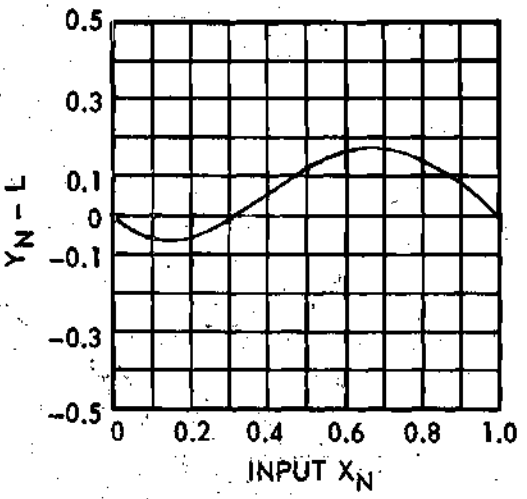
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.025993	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.257192	= 1.075864
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.036449	-0.063551	0.019413	-0.080587
0.143202	-0.056798	0.077862	-0.122138
0.297665	-0.002335	0.172459	-0.127541
0.466055	0.066055	0.296029	-0.103971
0.622794	0.122794	0.438734	-0.061266
0.755586	0.155586	0.589717	-0.010283
0.860540	0.160540	0.737299	0.037299
0.936860	0.136860	0.867694	0.067694
0.983868	0.083868	0.962916	0.062916
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

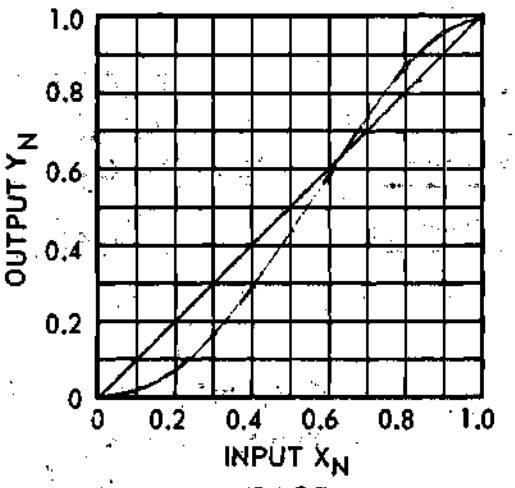


TRACE

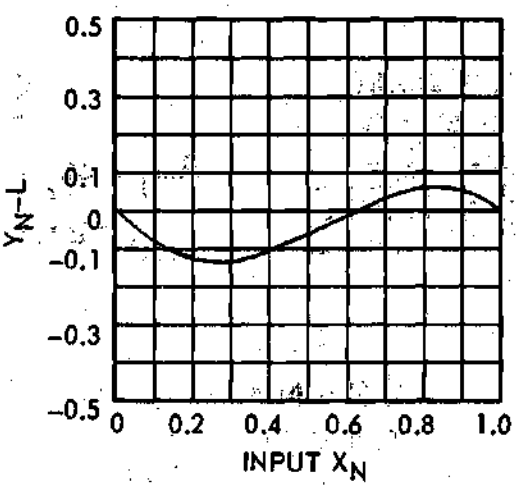


DEVIATION

CRANK RANGE RC1



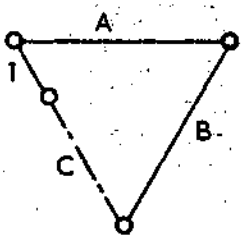
TRACE



DEVIATION

CRANK RANGE RC2

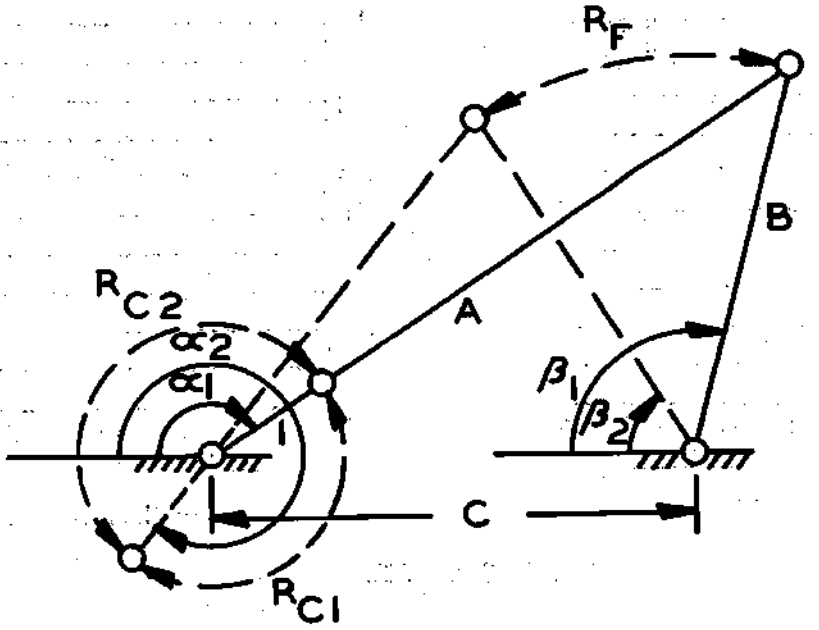
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.0

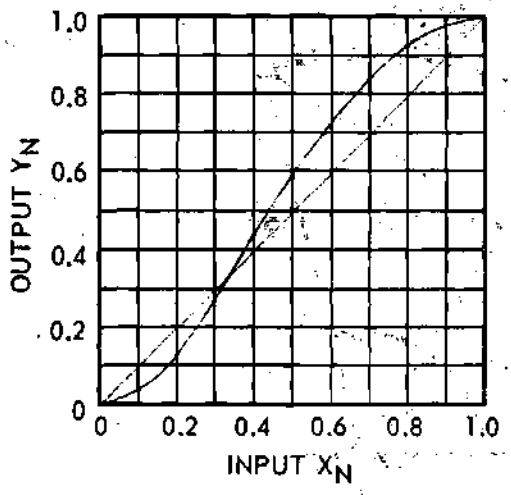
C = 4.0



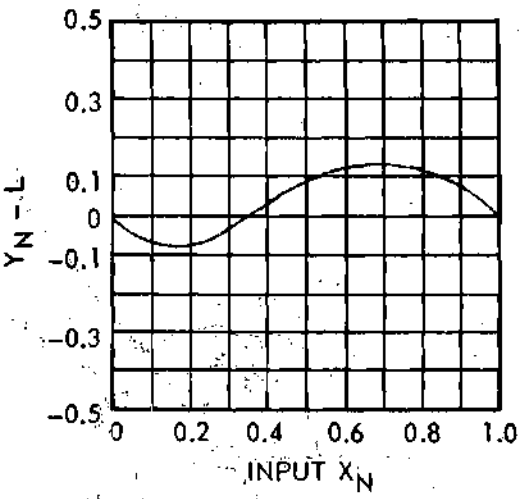
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.190716	$R_F = \beta_1 - \beta_2$
B = 2.0	$R_{C2} = 2\pi - R_{C1} =$ 3.092469	= 1.052413
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034205	-0.065795	0.022388	-0.077612
0.132519	-0.067481	0.090650	-0.109350
0.274822	-0.025178	0.198872	-0.101128
0.433195	0.033195	0.344218	-0.065782
0.585787	0.085787	0.482867	-0.017133
0.720906	0.120906	0.632569	0.032569
0.833569	0.133569	0.771982	0.071982
0.920891	0.120891	0.889093	0.089093
0.978734	0.078733	0.970063	0.070063
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

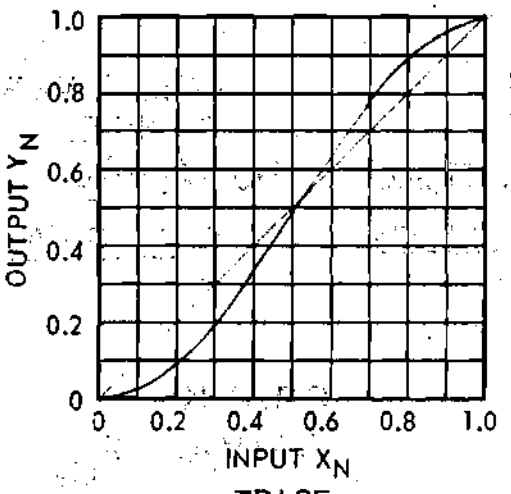


TRACE

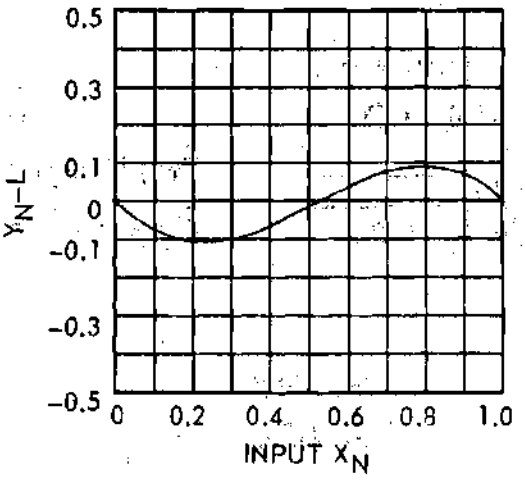


DEVIATION

CRANK RANGE RC1



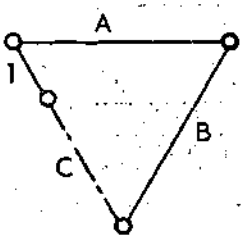
TRACE



DEVIATION

CRANK RANGE RC2

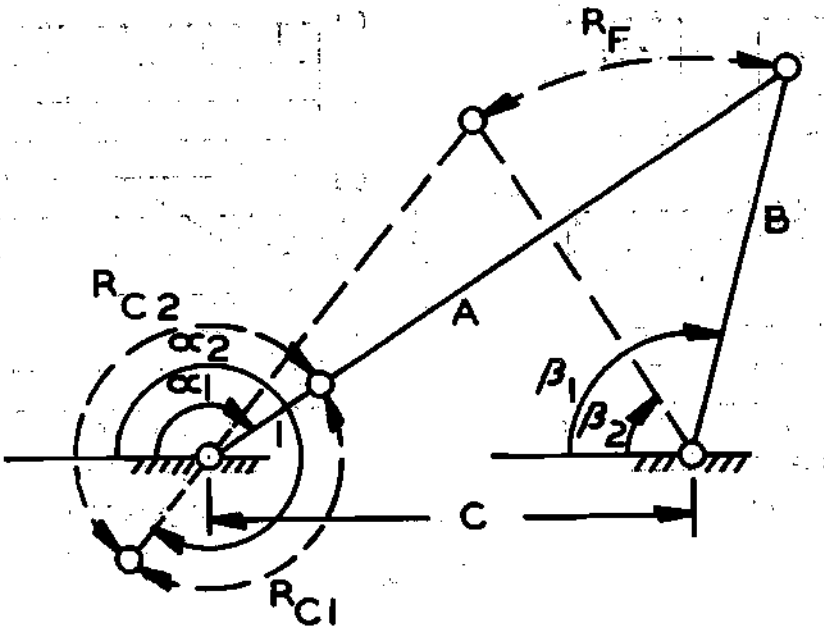
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.0

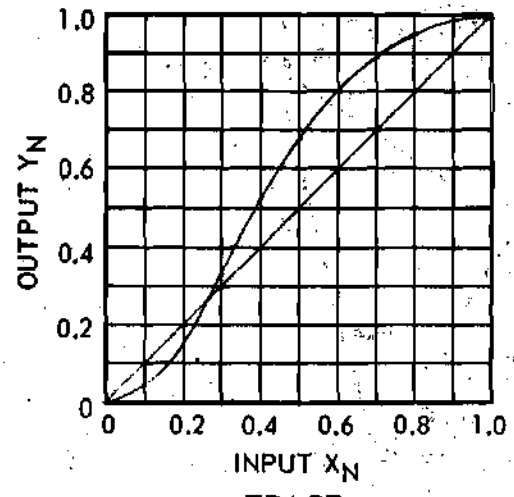
C = 4.5



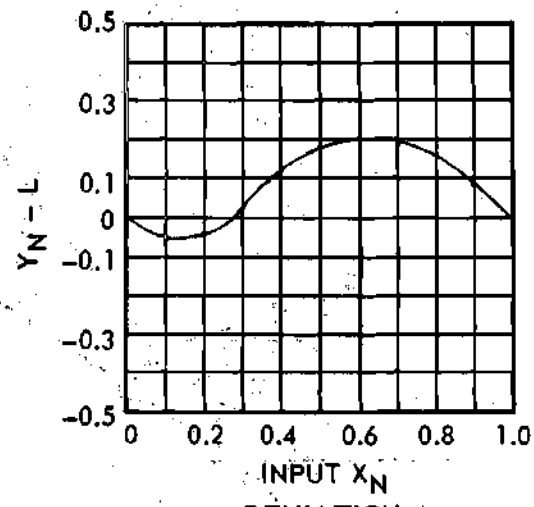
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.671802	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.611383	= 1.137360
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.038256	-0.061744	0.018213	-0.081787
0.157826	-0.042174	0.070397	-0.129603
0.333952	0.033952	0.153076	-0.146924
0.518919	0.118919	0.262173	-0.137827
0.679562	0.179562	0.392409	-0.107591
0.804834	0.204834	0.537065	-0.062935
0.895427	0.195427	0.687489	-0.012511
0.955520	0.155520	0.831405	0.031405
0.989297	0.089297	0.948314	0.048314
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

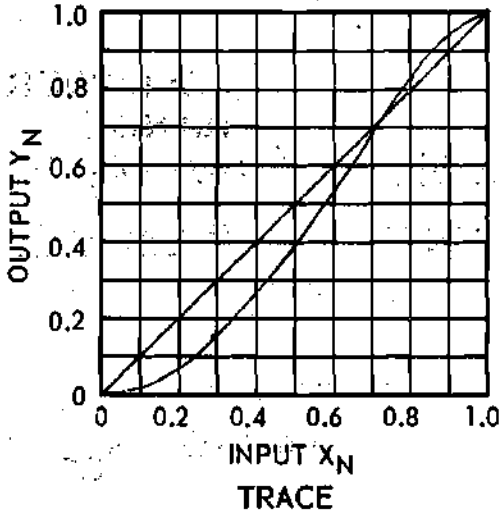


TRACE

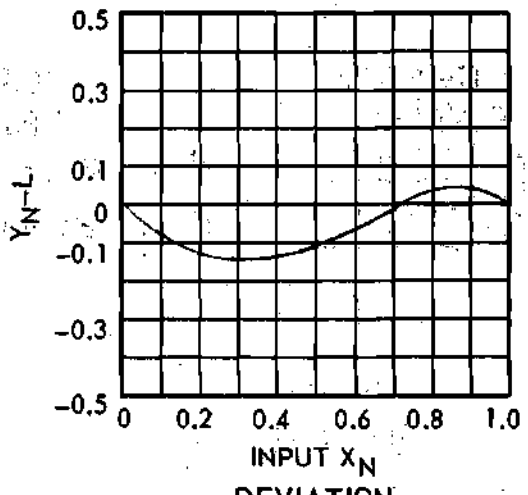


DEVIATION

CRANK RANGE RG1



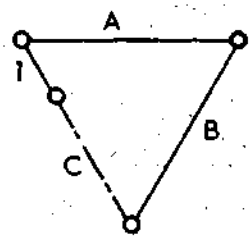
TRACE



DEVIATION

CRANK RANGE RG2

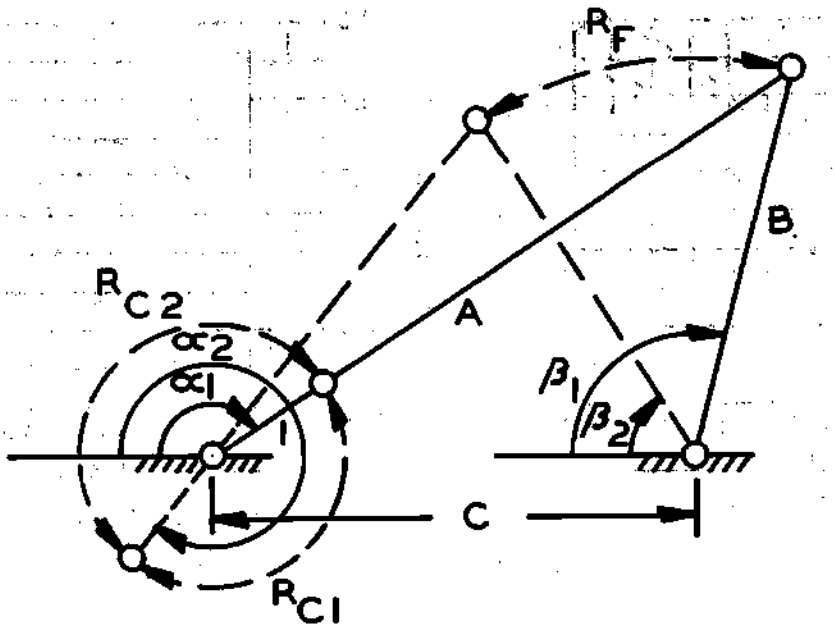
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.5

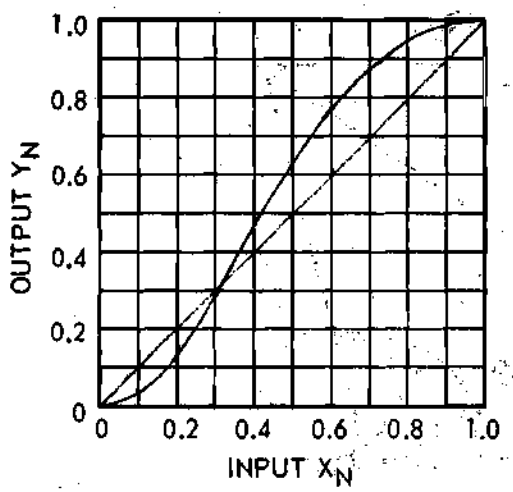
C = 3.0

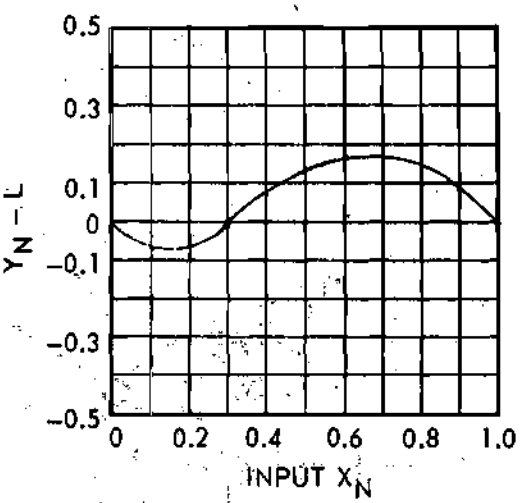


LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.849165	$R_F = \beta_1 - \beta_2$
B = 2.5		= 0.954383
C = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.434020	

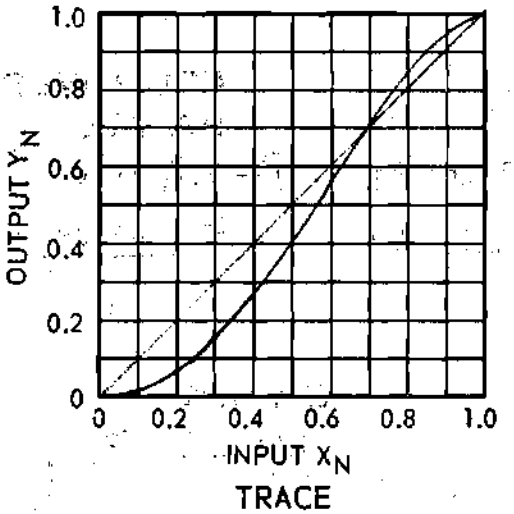
CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.034848	-0.065152	0.018598	-0.081402
0.140709	-0.059291	0.073035	-0.126965
0.299696	-0.000304	0.160489	-0.139511
0.476324	0.076324	0.276317	-0.123683
0.639691	0.139691	0.413699	-0.086301
0.774248	0.174248	0.563709	-0.036291
0.876017	0.176017	0.715133	0.015133
0.946098	0.146098	0.853330	0.053330
0.986773	0.086773	0.957811	0.057811
1.000000	0.000000	1.000000	0.000000

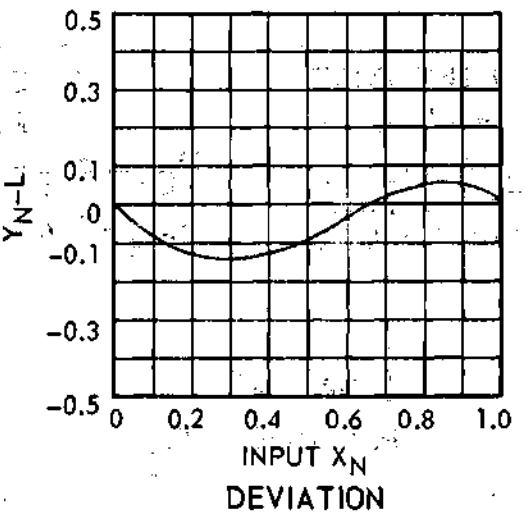
All angles measured in radians.





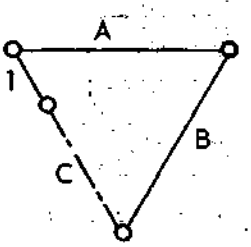
CRANK RANGE RC1





CRANK RANGE RC2

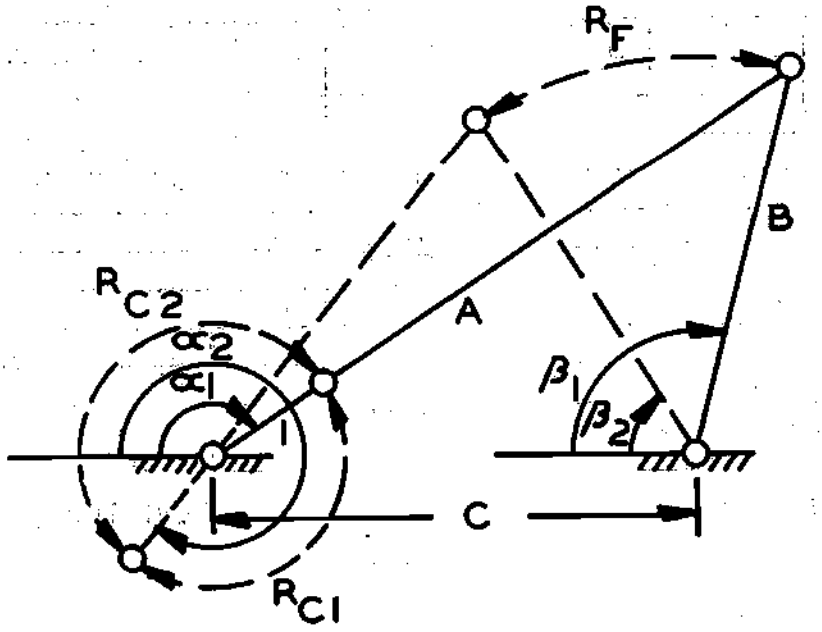
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.5

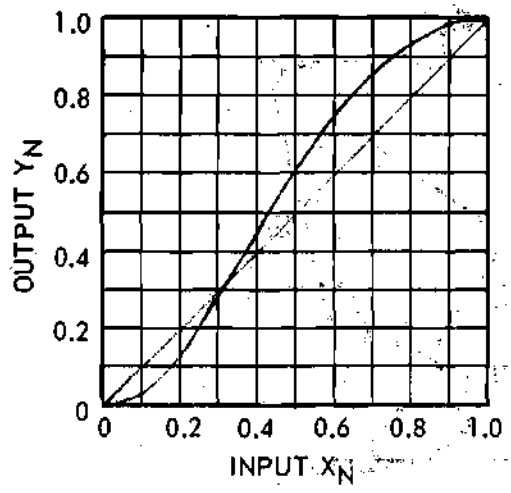
C = 3.5



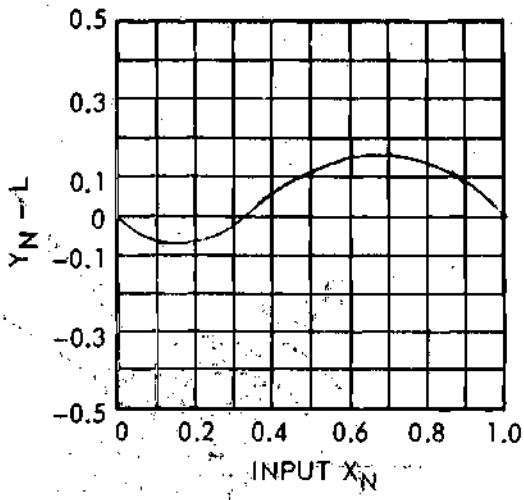
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.985585	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.297600	= 0.862088
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033897	-0.066103	0.018989	-0.081011
0.134463	-0.065537	0.075629	-0.124371
0.284615	-0.015385	0.167562	-0.132438
0.454125	0.054125	0.289232	-0.110768
0.615637	0.115637	0.432018	-0.067982
0.753376	0.153376	0.585002	-0.014998
0.861329	0.161329	0.735337	0.035337
0.938320	0.138320	0.867711	0.067711
0.984534	0.084534	0.963287	0.063287
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

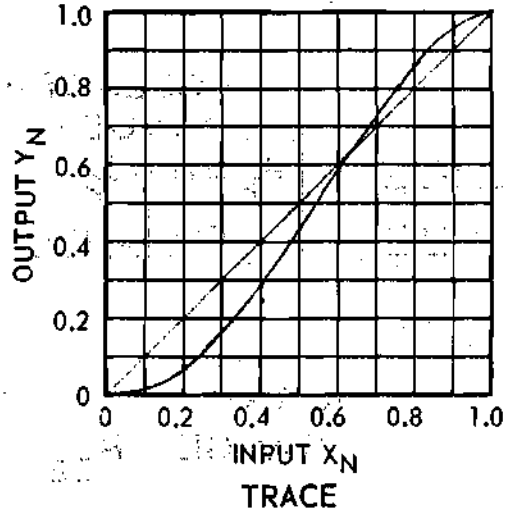


TRACE

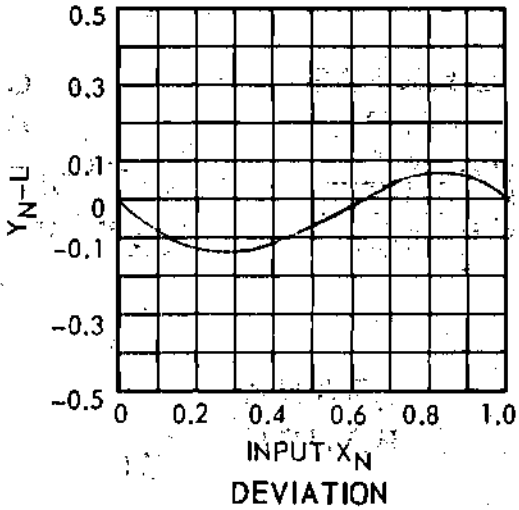


DEVIATION

CRANK RANGE RC1



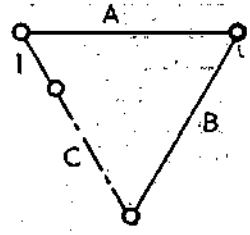
TRACE



DEVIATION

CRANK RANGE RC2

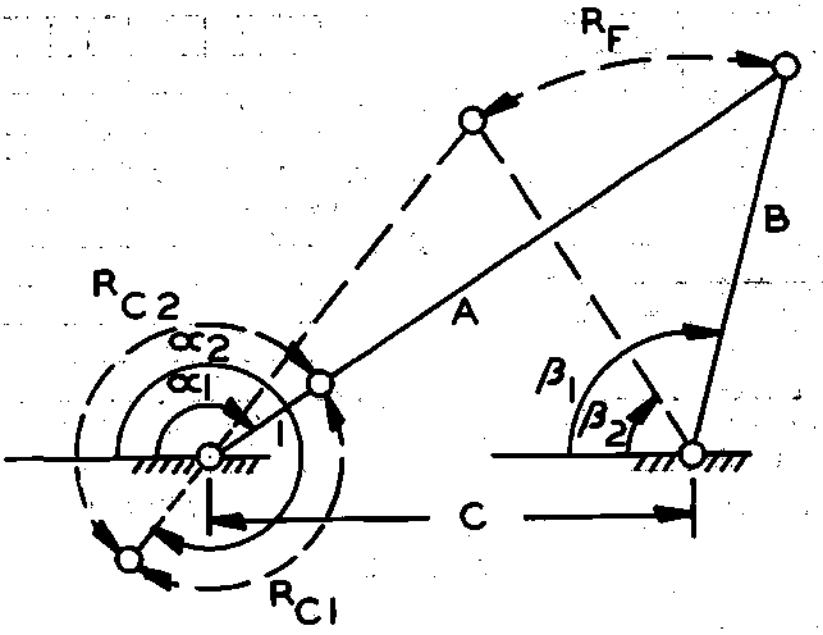
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.5

C = 4.0



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.112622	$R_F = \beta_1 - \beta_2$
B = 2.5		
C = 4.5	$R_{C2} = 2\pi - R_{C1} =$ 3.170563	= 0.824406

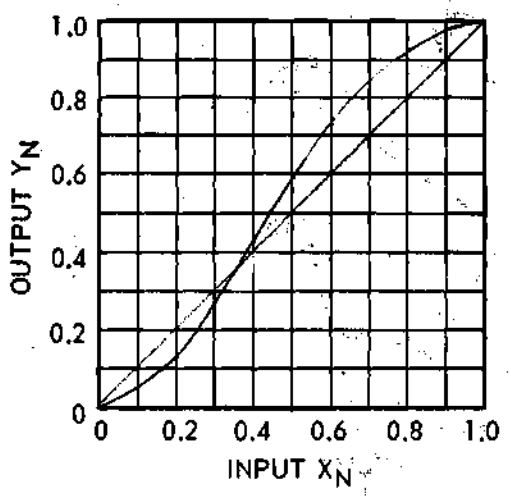
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.033366	-0.066634
0.130401	-0.069599
0.273850	-0.026150
0.436698	0.036698
0.594840	0.094840
0.733580	0.133580
0.846146	0.146146
0.929625	0.129625
0.981853	0.081853
1.000000	0.000000

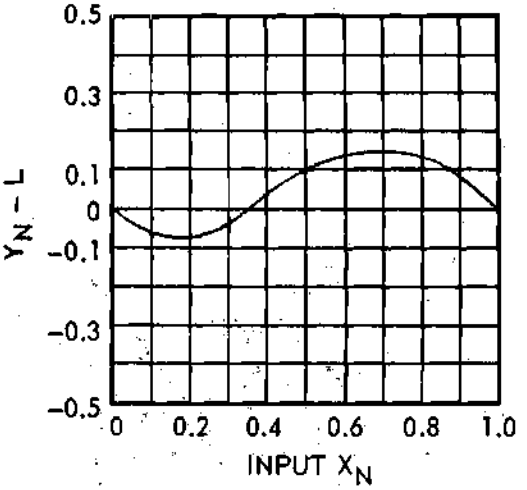
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.019856	-0.080144
0.080141	-0.119859
0.178400	-0.121600
0.307059	-0.092941
0.454900	-0.045100
0.609081	0.009081
0.756000	0.056000
0.880984	0.080984
0.967843	0.067843
1.000000	0.000000

All angles measured in radians.

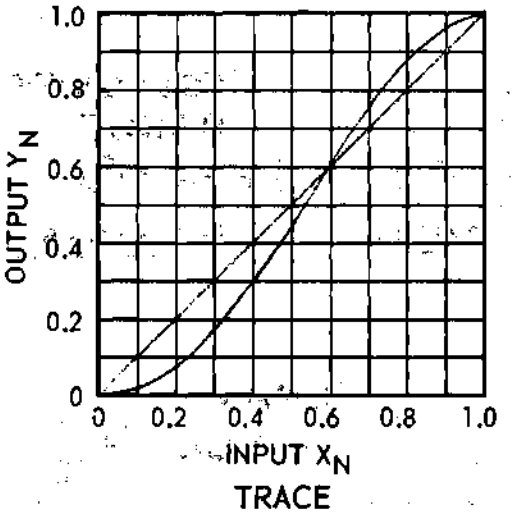


TRACE

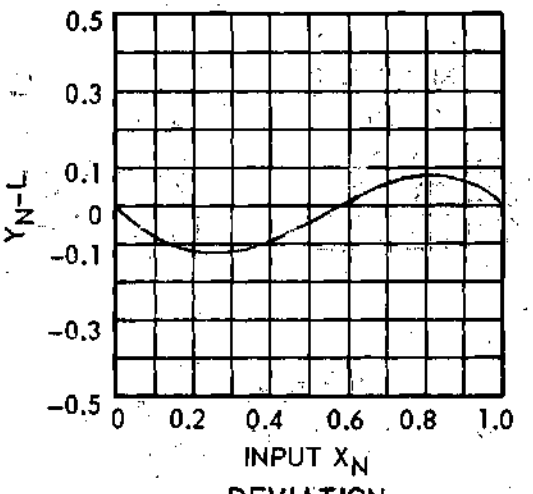


DEVIATION

CRANK RANGE RC1



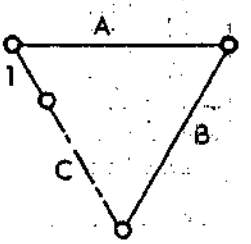
TRACE



DEVIATION

CRANK RANGE RC2

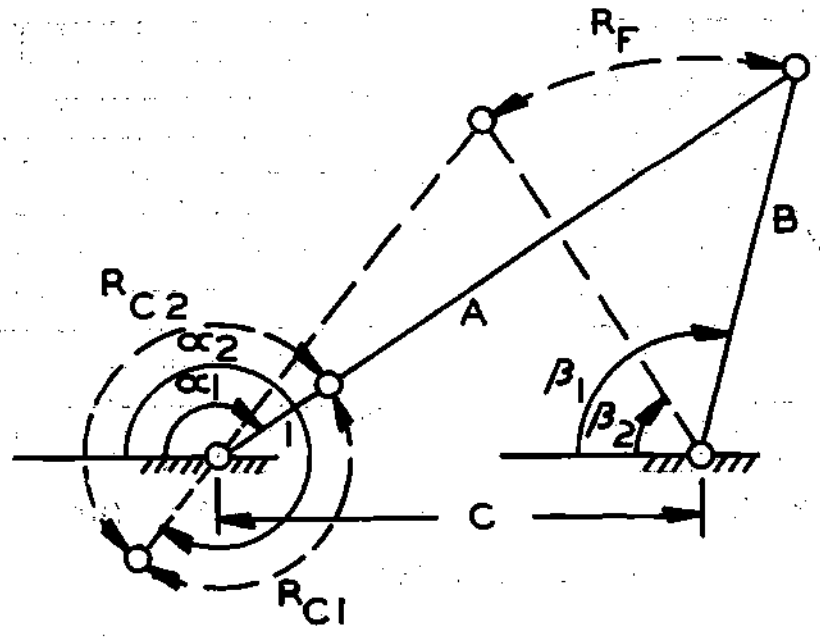
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.5

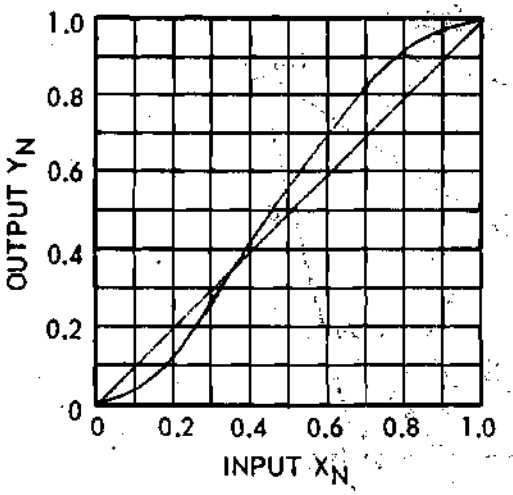
C = 4.5



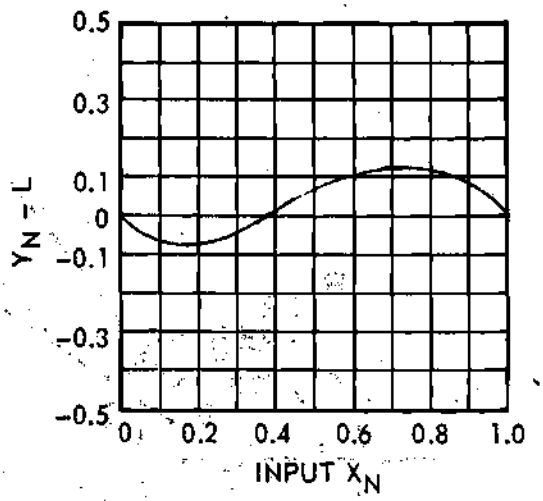
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.257192	$R_F = \beta_1 - \beta_2$
B = 2.5	$R_{C2} = 2\pi - R_{C1} =$ 3.025993	= 0.844665
C = 5.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032529	-0.067471	0.022555	-0.077445
0.125401	-0.074599	0.091998	-0.108002
0.261167	-0.038833	0.203046	-0.096954
0.415639	0.015639	0.342330	-0.057670
0.568205	0.068205	0.494593	-0.005407
0.706248	0.106248	0.646047	0.046047
0.823331	0.123331	0.784298	0.084298
0.915338	0.115338	0.897301	0.097301
0.977047	0.077047	0.972907	0.072907
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

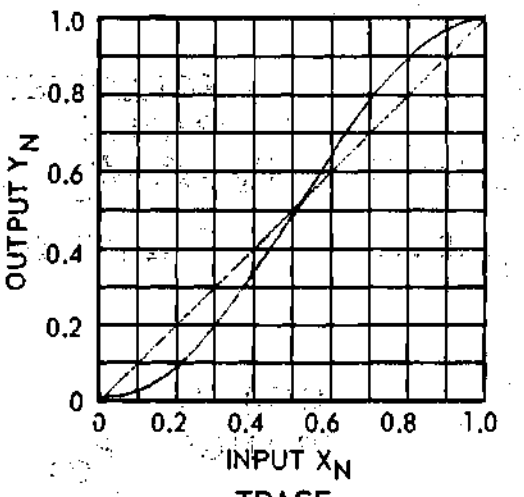


TRACE

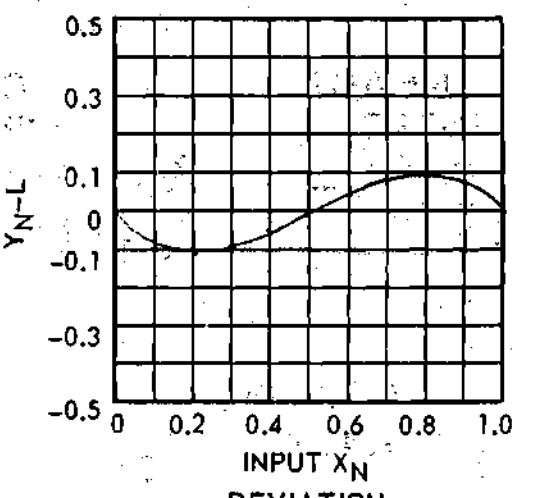


DEVIATION

CRANK RANGE RC1



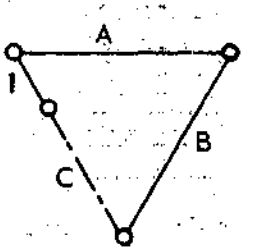
TRACE



DEVIATION

CRANK RANGE RC2

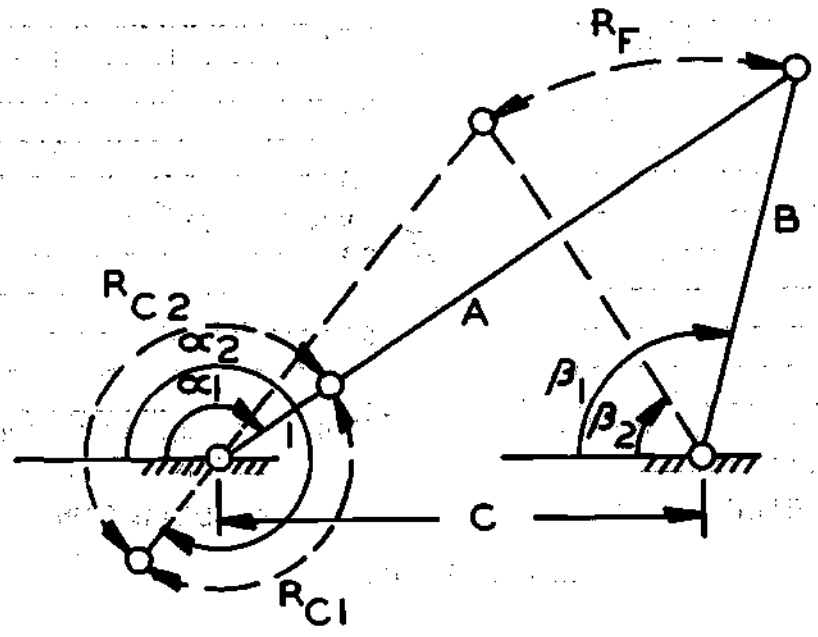
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 2.5

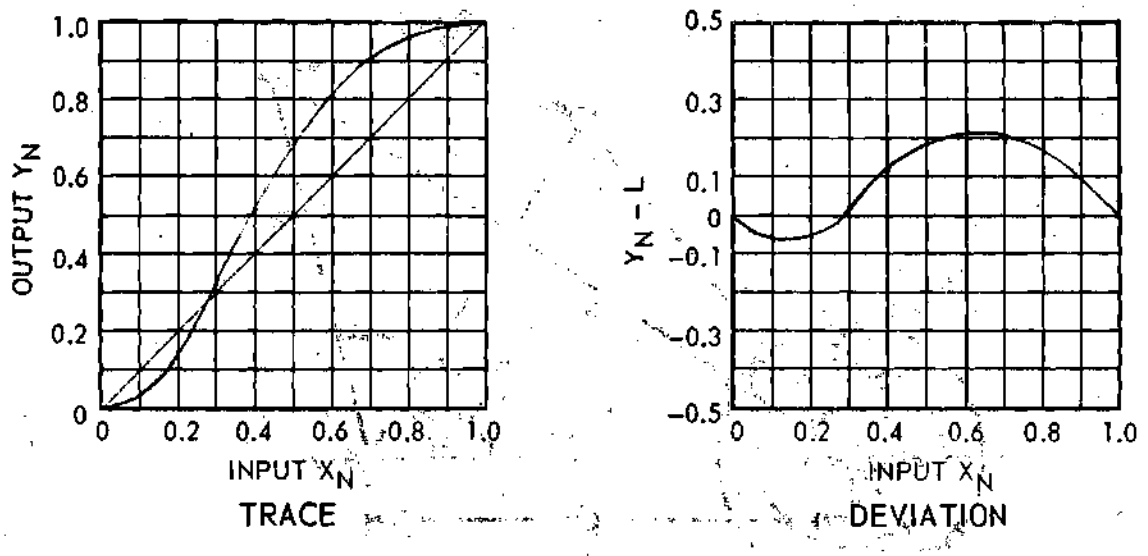
C = 5.0



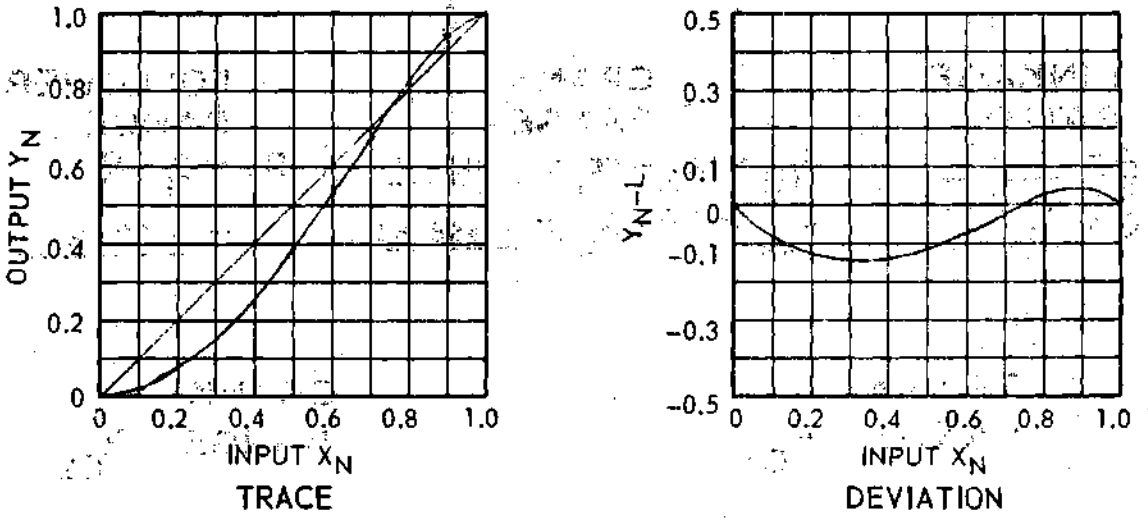
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.474023	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.809162	= 1.137360
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.033792	-0.066208	0.019533	-0.080467
0.146075	-0.053925	0.073358	-0.126642
0.323697	0.023697	0.156142	-0.143858
0.517780	0.117780	0.263528	-0.136472
0.686163	0.186163	0.390906	-0.109094
0.814042	0.214042	0.532622	-0.067378
0.903141	0.203141	0.681132	-0.018868
0.959917	0.159917	0.825189	0.025189
0.990602	0.090602	0.944989	0.044989
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

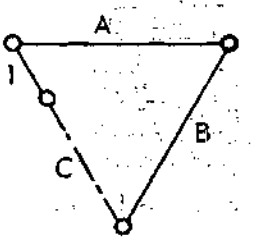


CRANK RATIO 1.01



CRANK RATIO 1.02

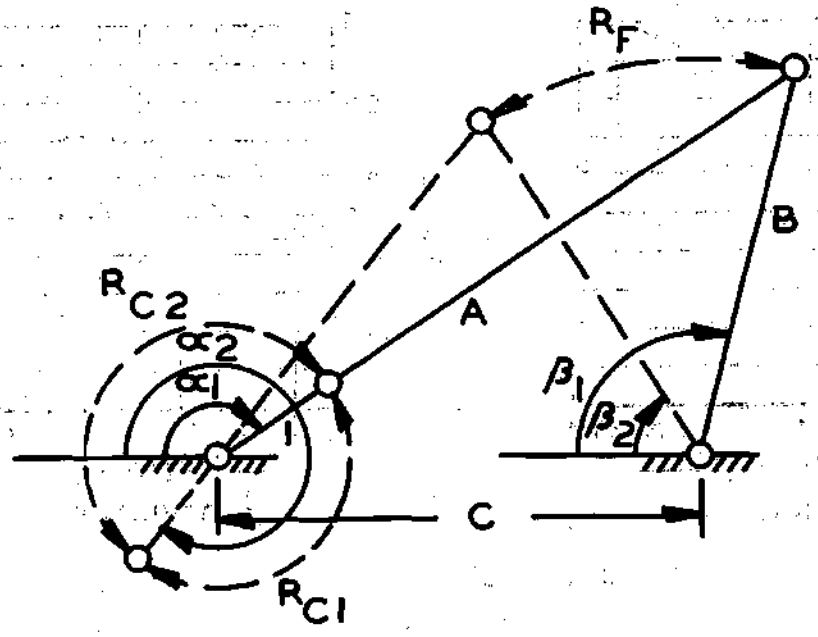
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

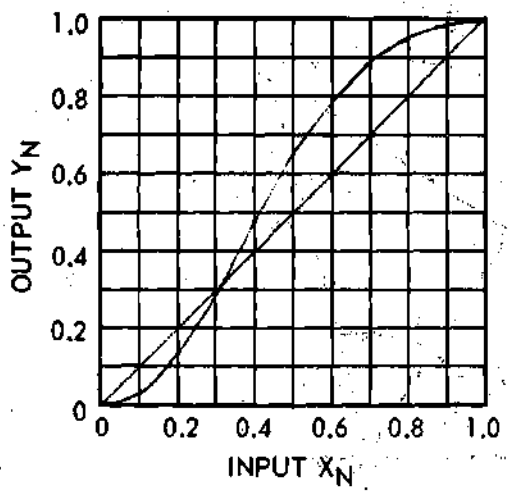
C = 2.5



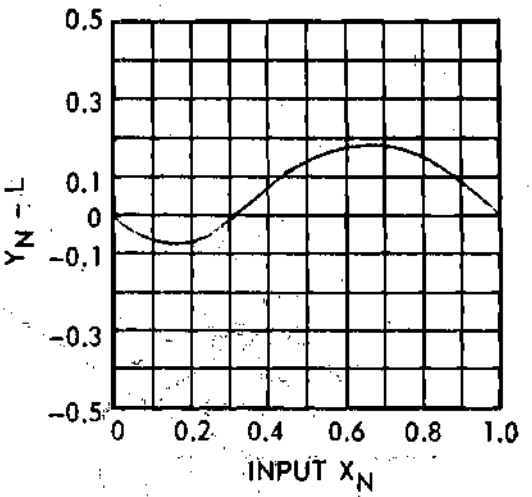
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.825123	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.458062	= 0.802361
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031898	-0.068102	0.019122	-0.080878
0.129699	-0.070301	0.074465	-0.125535
0.281199	-0.018801	0.162712	-0.137288
0.456547	0.056547	0.279273	-0.120727
0.624250	0.124250	0.417522	-0.082478
0.764869	0.164869	0.568424	-0.031576
0.871599	0.171599	0.720185	0.020185
0.944639	0.144639	0.857393	0.057393
0.986544	0.086544	0.959501	0.059501
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

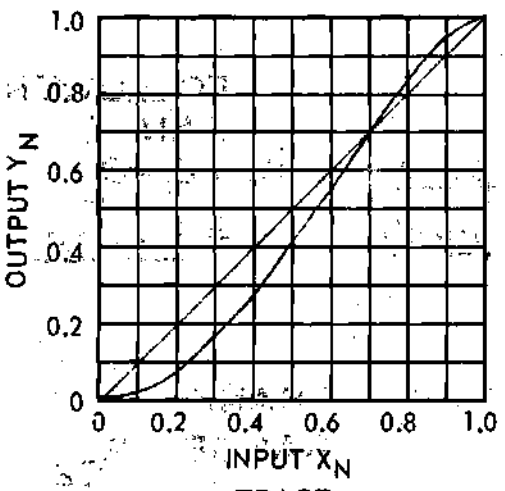


TRACE

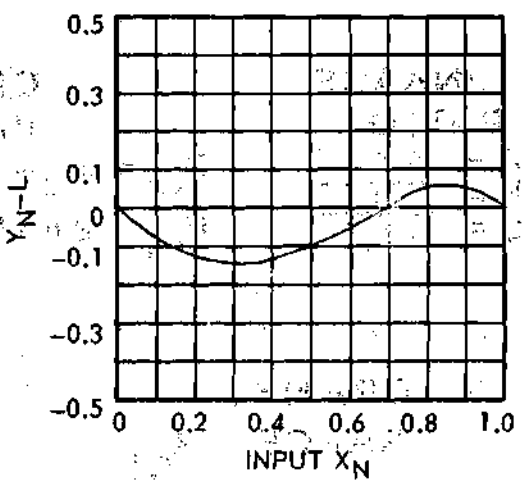


DEVIATION

CRANK RANGE RC1



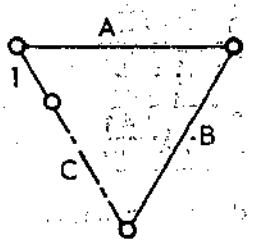
TRACE



DEVIATION

CRANK RANGE RC2

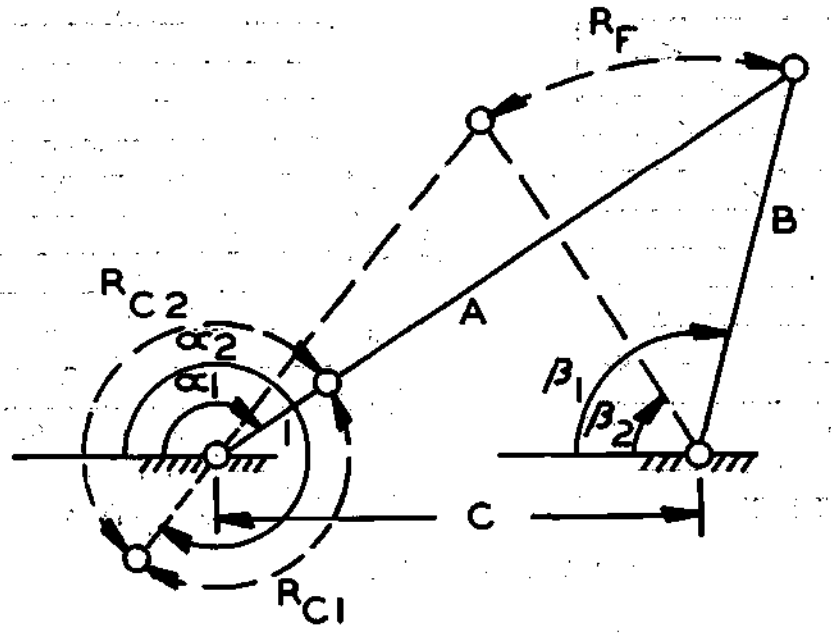
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

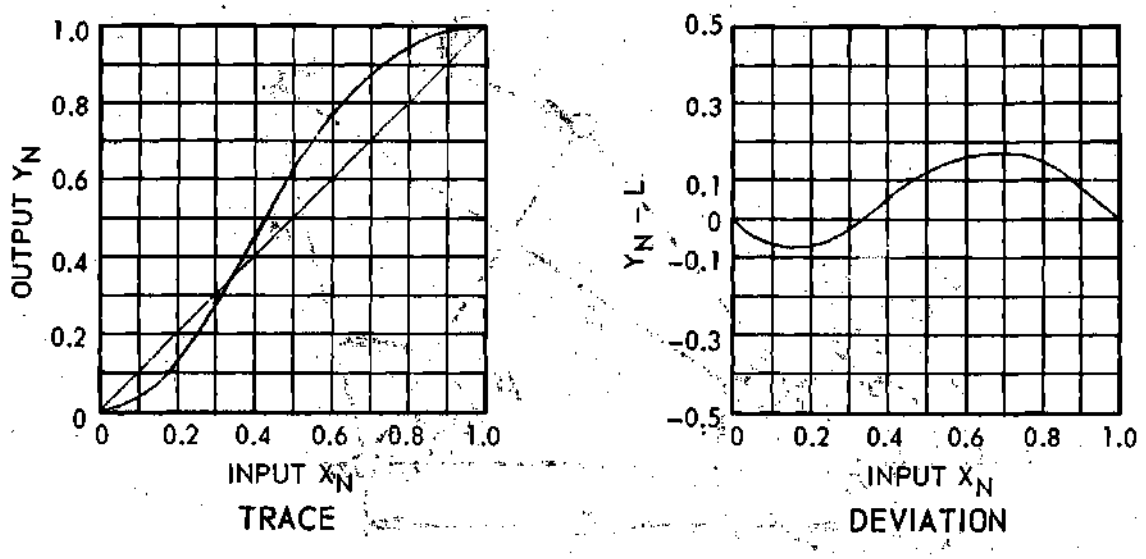
C = 3.0



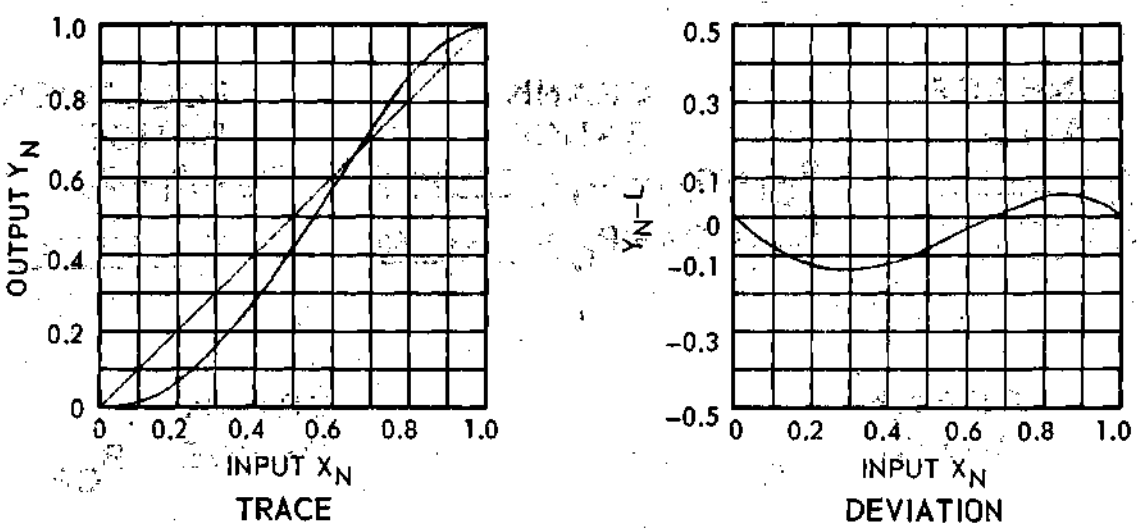
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.825123	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.458062	= 0.802361
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031898	-0.068102	0.019122	-0.080878
0.129699	-0.070301	0.074465	-0.125535
0.281199	-0.018801	0.162712	-0.137288
0.456547	0.056547	0.279273	-0.120727
0.624250	0.124250	0.417522	-0.082478
0.764869	0.164869	0.568424	-0.031576
0.871599	0.171599	0.720185	0.020185
0.944639	0.144639	0.857393	0.057393
0.986544	0.086544	0.959501	0.059501
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

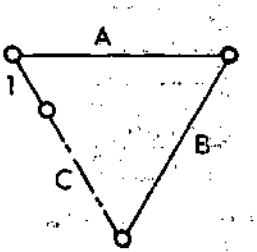


CRANK RANGE RC1



CRANK RANGE RC2

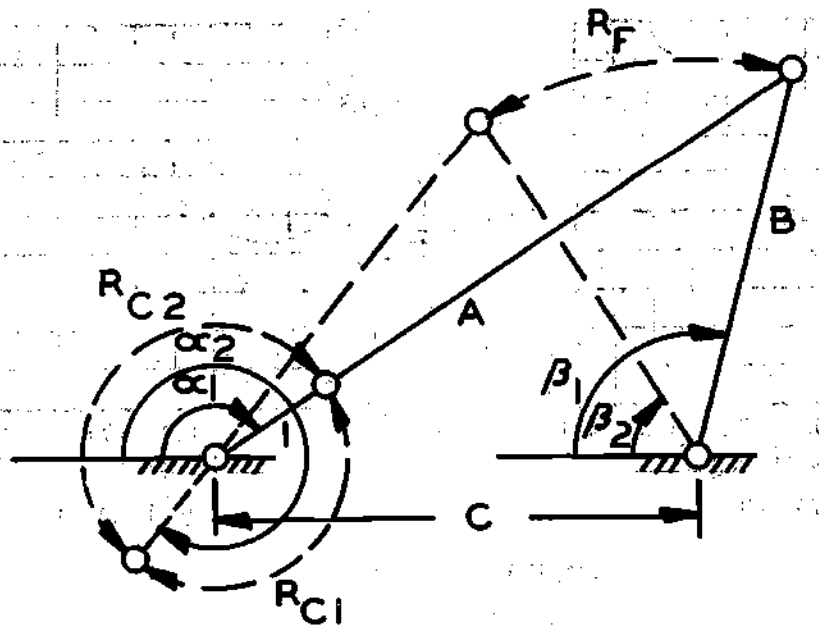
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

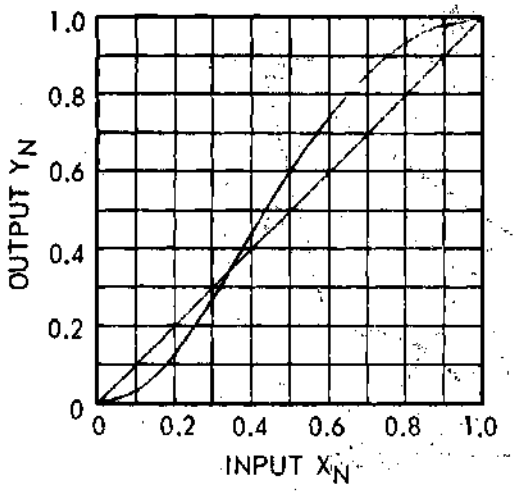
C = 3.5



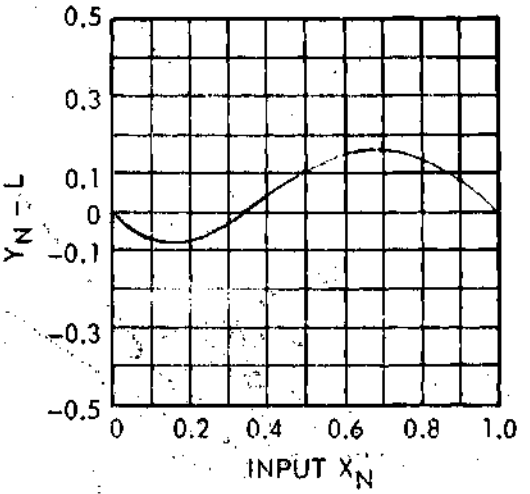
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.944025	$R_F = \beta_1 - \beta_2$
B = 3.0		
C = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.339160	= 0.729728

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032155	-0.067845	0.019034	-0.080966
0.128436	-0.071564	0.075175	-0.124825
0.275190	-0.024810	0.165877	-0.134123
0.444962	0.044962	0.286231	-0.113769
0.609681	0.109681	0.428441	-0.071559
0.751092	0.151092	0.581925	-0.018075
0.861423	0.161423	0.733484	0.033484
0.939110	0.139110	0.867053	0.067053
0.984931	0.084931	0.963214	0.063214
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

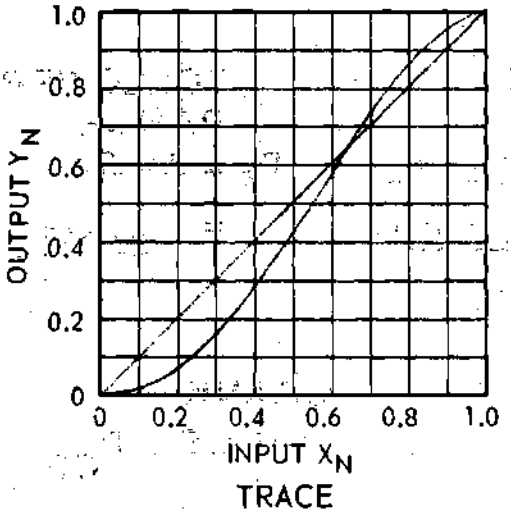


TRACE

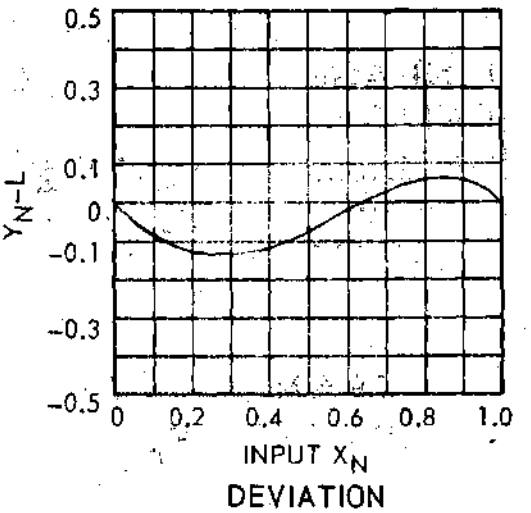


DEVIATION

CRANK RANGE RC1



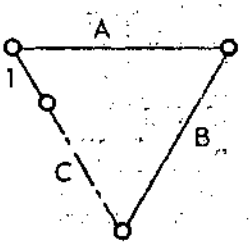
TRACE



DEVIATION

CRANK RANGE RC2

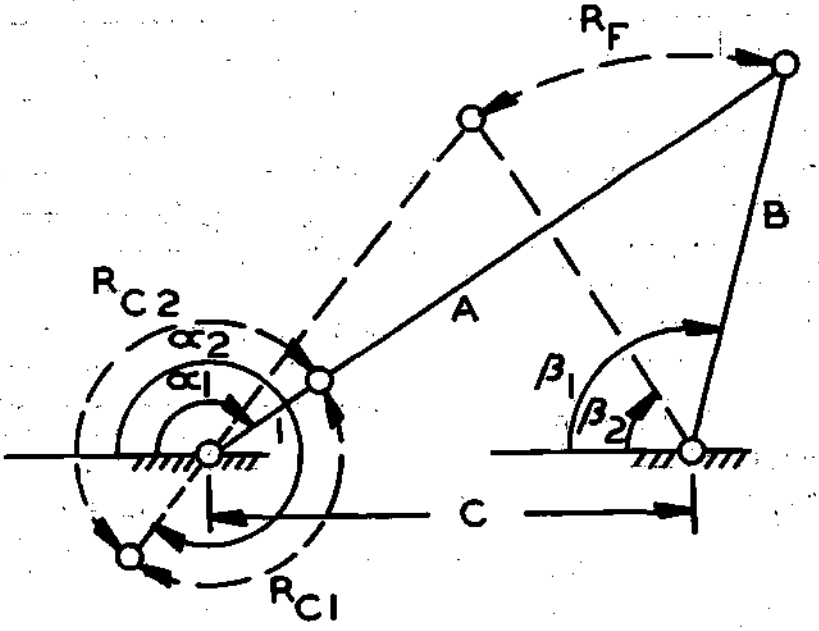
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

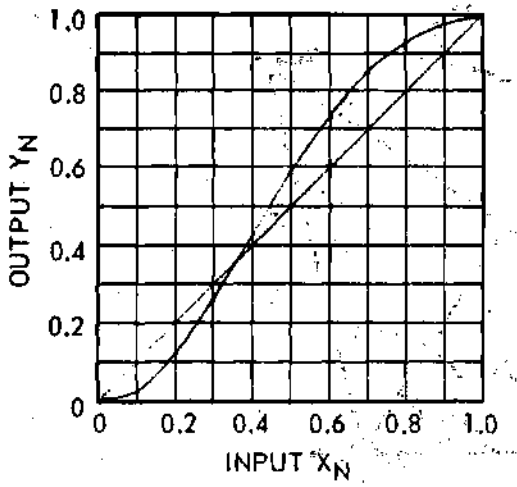
C = 4.0



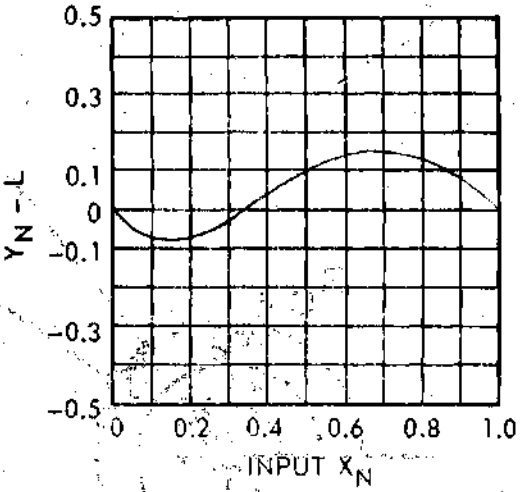
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.053042	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.230143	= 0.689997
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032393	-0.067607	0.019205	-0.080795
0.127504	-0.072496	0.076864	-0.123136
0.270392	-0.029608	0.170965	-0.129035
0.435249	0.035249	0.295809	-0.104191
0.596769	0.096769	0.441986	-0.058014
0.738144	0.138144	0.597257	-0.002743
0.851294	0.151294	0.747381	0.047381
0.933304	0.133304	0.876352	0.076352
0.983155	0.083155	0.966507	0.066507
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

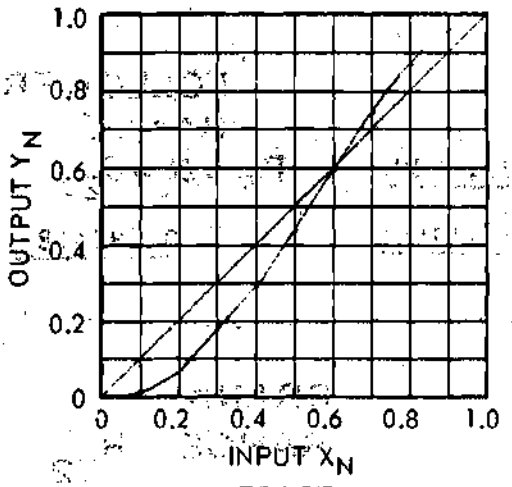


TRACE

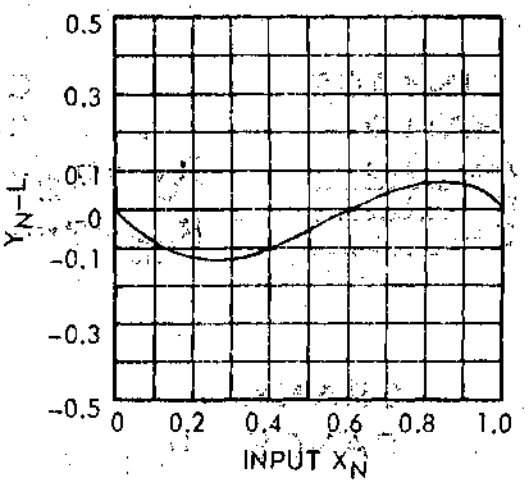


DEVIATION

CRANK RANGE RC1



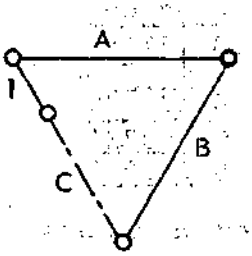
TRACE



DEVIATION

CRANK RANGE RC2

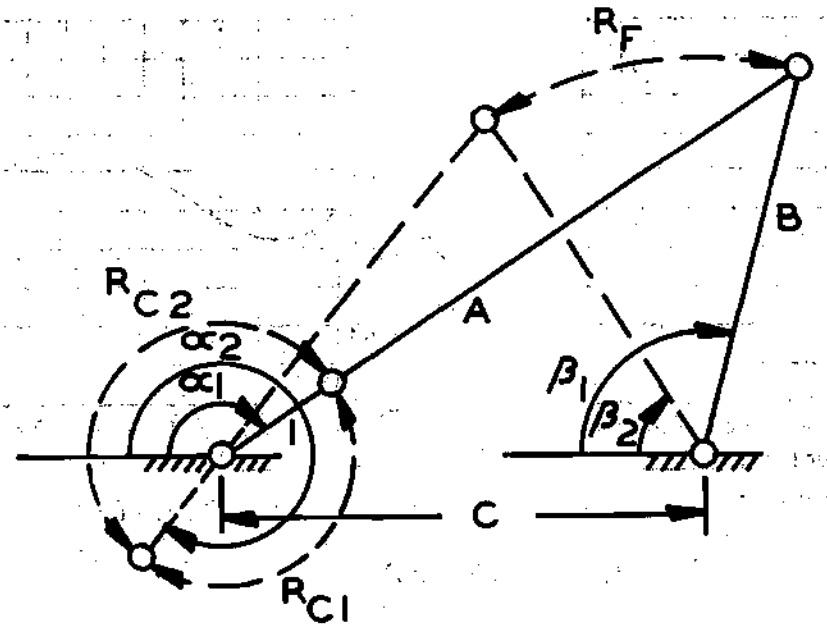
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

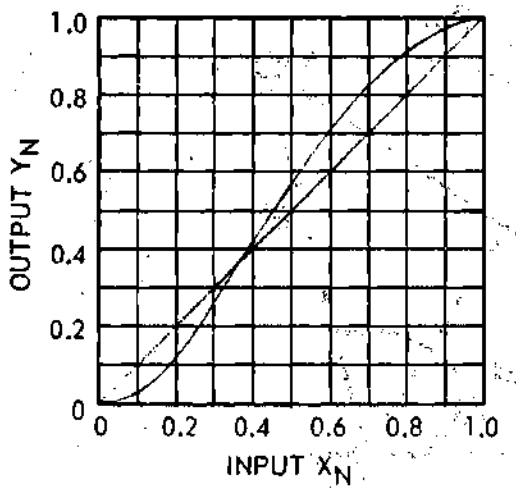
C = 4.5



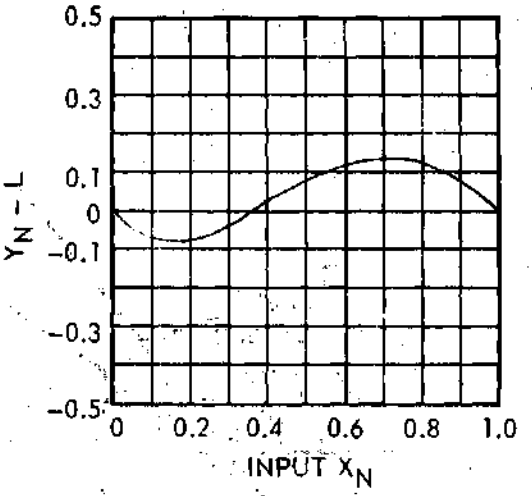
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.165292	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.117893	= 0.680418
C = 5.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032423	-0.067577	0.019938	-0.080062
0.125970	-0.074030	0.080853	-0.119147
0.264667	-0.035333	0.180718	-0.119282
0.424229	0.024229	0.311869	-0.088131
0.581971	0.081971	0.462334	-0.037666
0.722782	0.122782	0.618132	0.018132
0.838714	0.138714	0.764652	0.064652
0.925729	0.125729	0.886951	0.086951
0.980726	0.080726	0.969967	0.069967
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

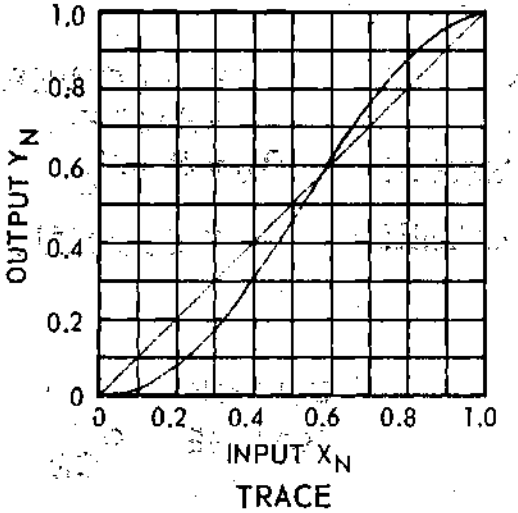


TRACE

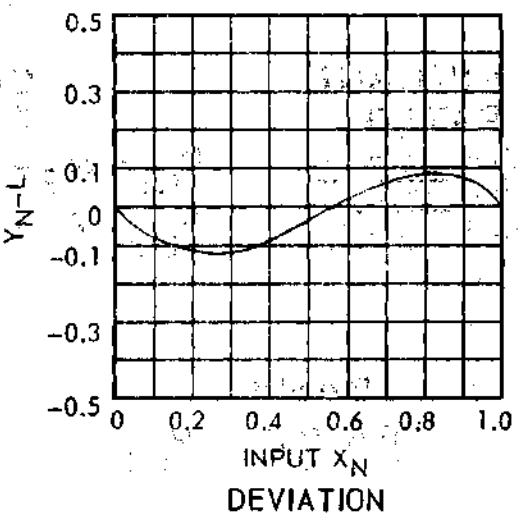


DEVIATION

CRANK RANGE RC1



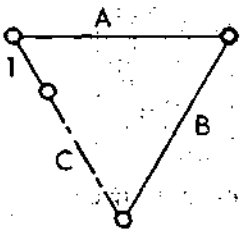
TRACE



DEVIATION

CRANK RANGE RC2

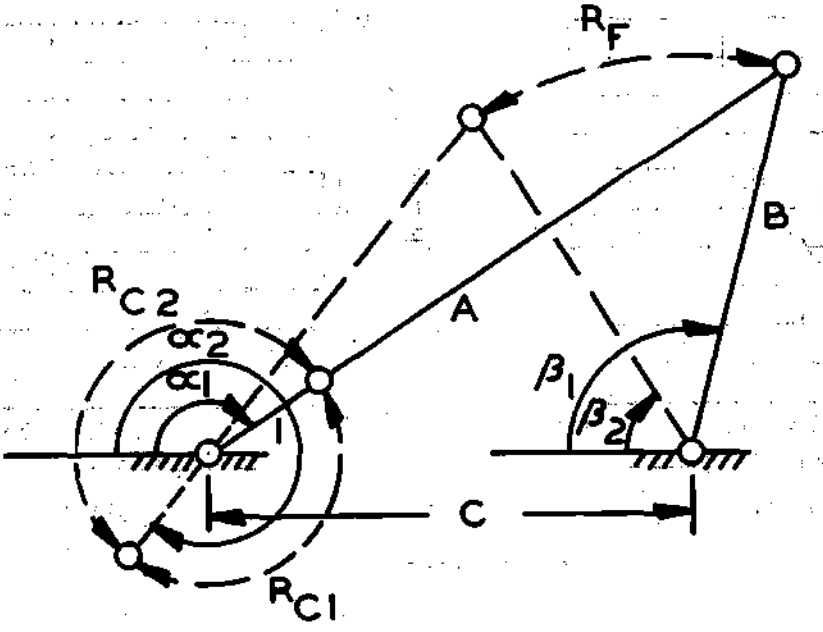
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

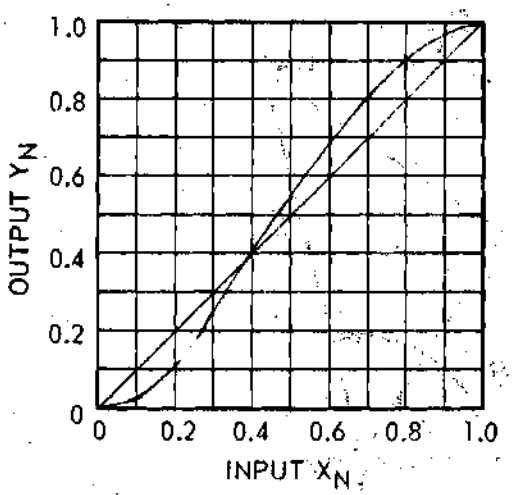
C = 5.0



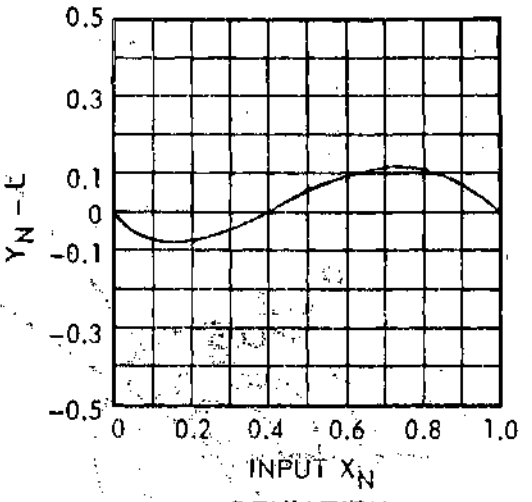
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.302290	$R_F = \beta_1 - \beta_2$
B = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 2.980895	= 0.713151
C = 5.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031915	-0.068085	0.022520	-0.077480
0.122435	-0.077565	0.092378	-0.107622
0.254942	-0.045058	0.204886	-0.095114
0.407027	0.007027	0.346450	-0.053550
0.559047	0.059047	0.500883	0.000883
0.698233	0.098233	0.653395	0.053395
0.817499	0.117499	0.790976	0.090976
0.912055	0.112055	0.901669	0.101669
0.976011	0.076011	0.974384	0.074384
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

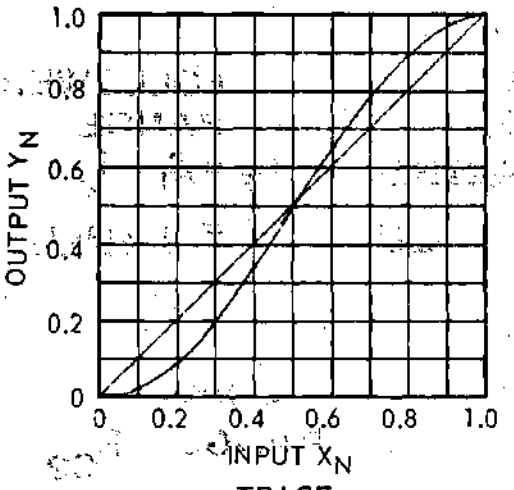


TRACE

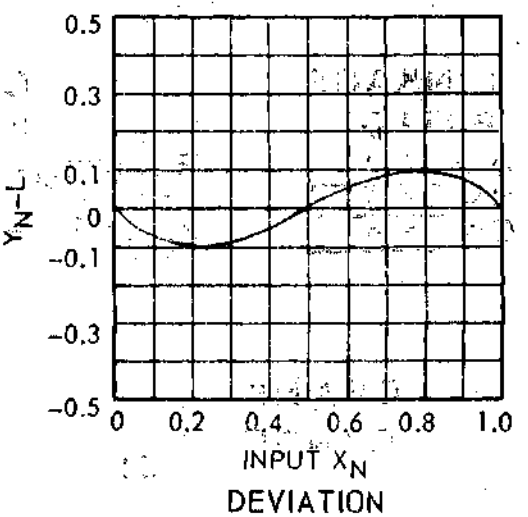


DEVIATION

CRANK RANGE RC1



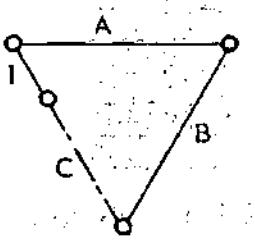
TRACE



DEVIATION

CRANK RANGE RC2

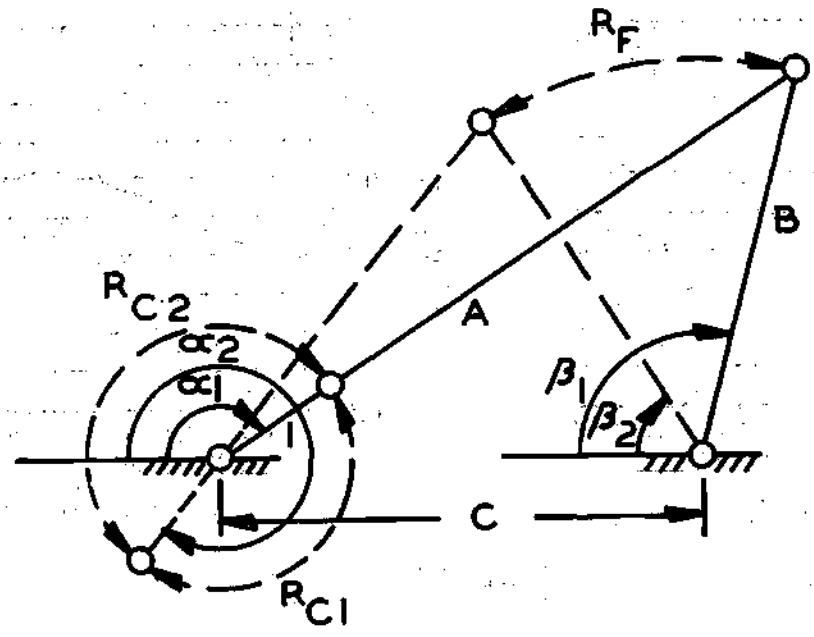
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.0

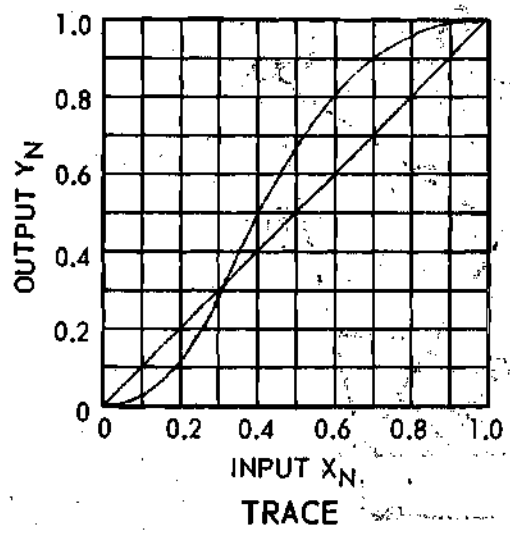
C = 5.5



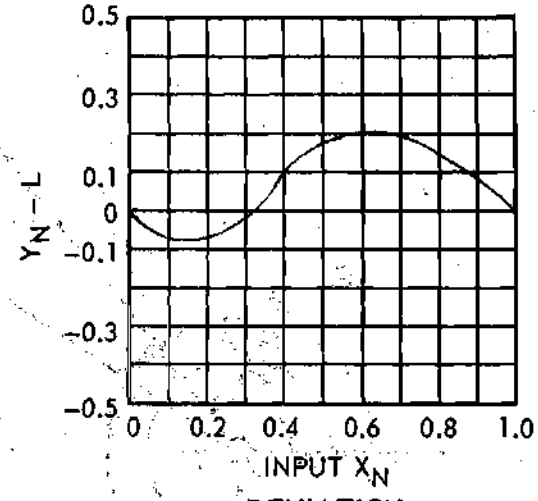
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.211441	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 4.071744	= 1.219476
C = 2.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027054	-0.072946	0.022390	-0.077610
0.124043	-0.075957	0.080493	-0.119507
0.296374	-0.003626	0.165732	-0.134268
0.502570	0.102570	0.272904	-0.127096
0.685451	0.185451	0.397758	-0.102242
0.820342	0.220342	0.535612	-0.064388
0.909812	0.209812	0.680205	-0.019795
0.963933	0.163933	0.821804	0.021804
0.991801	0.091801	0.942246	0.042246
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

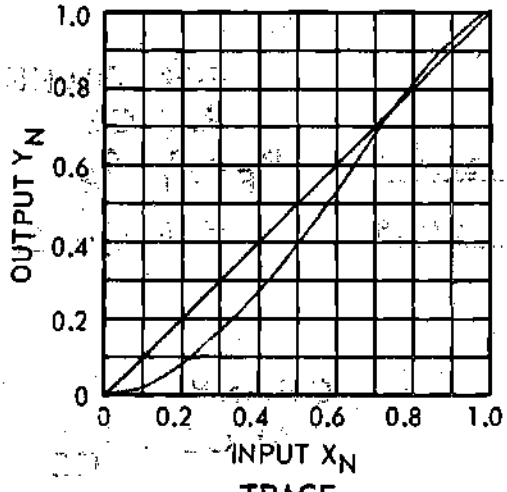


TRACE

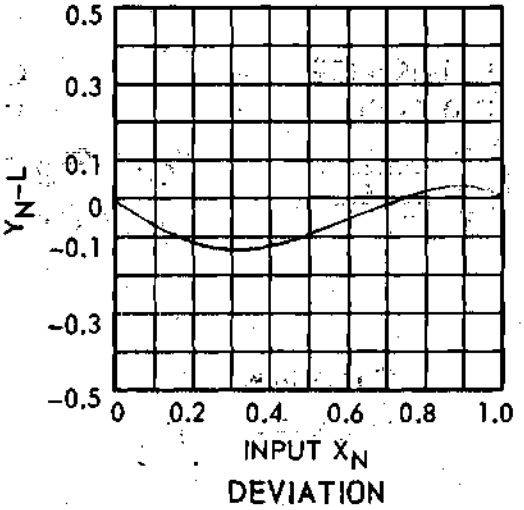


DEVIATION

CRANK RANGE RC1



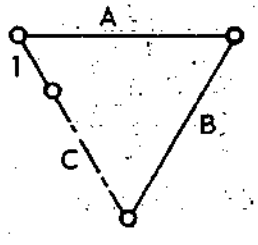
TRACE



DEVIATION

CRANK RANGE RC2

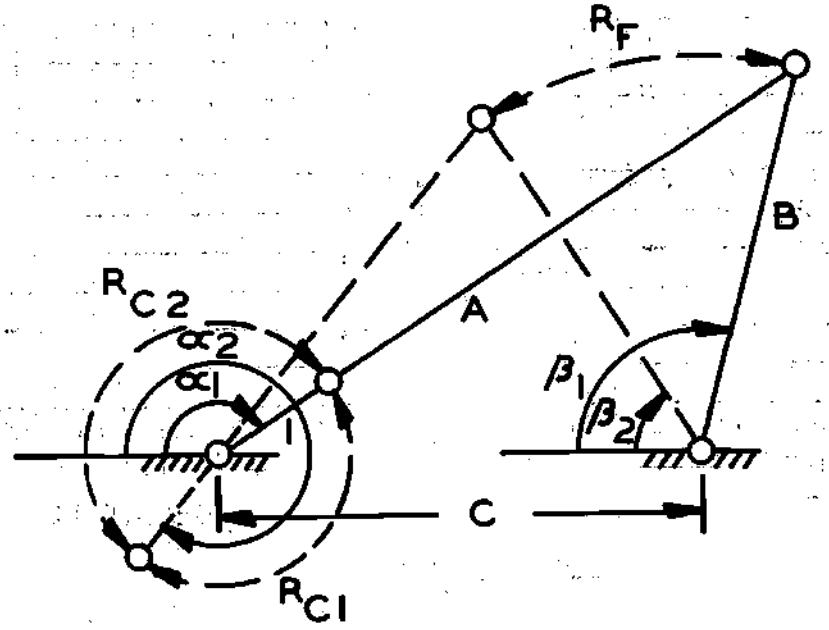
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

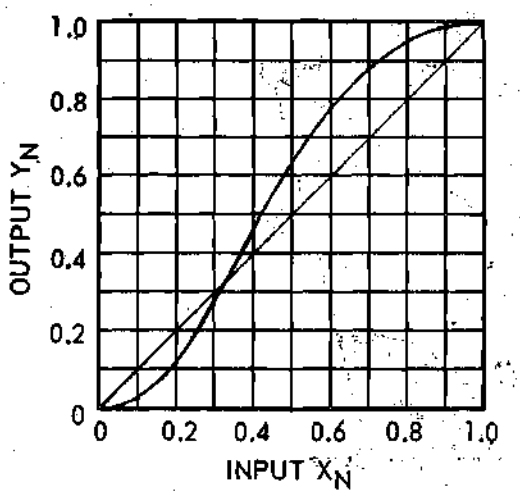
C = 2.0



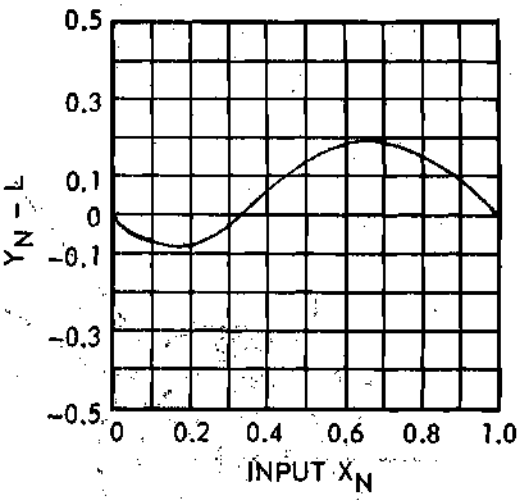
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.479637	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.803548	= 0.954383
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027647	-0.072353	0.021225	-0.078775
0.119482	-0.080518	0.078701	-0.121299
0.274393	-0.025607	0.165716	-0.134284
0.463018	0.063018	0.277187	-0.122813
0.642928	0.142928	0.408008	-0.091992
0.787077	0.187077	0.551880	-0.048120
0.889435	0.189435	0.700192	0.000192
0.954597	0.154597	0.840257	0.040257
0.989456	0.089456	0.951739	0.051739
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

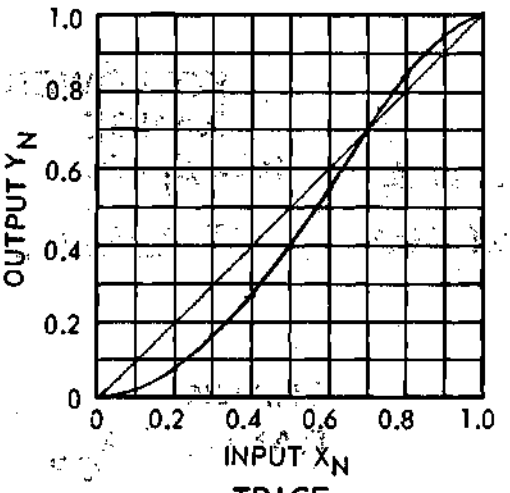


TRACE

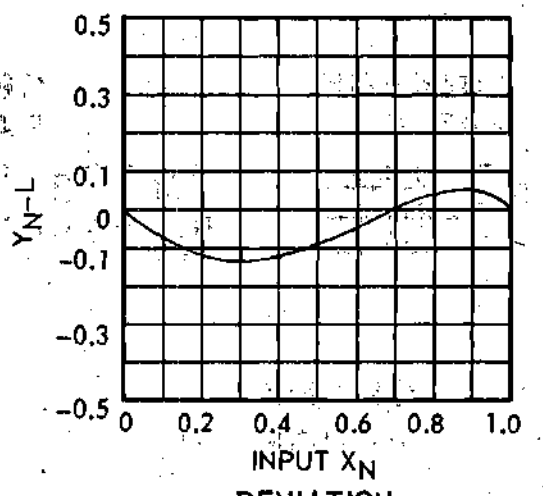


DEVIATION

CRANK RANGE RC1



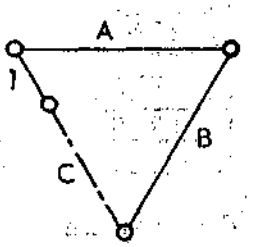
TRACE



DEVIATION

CRANK RANGE RC2

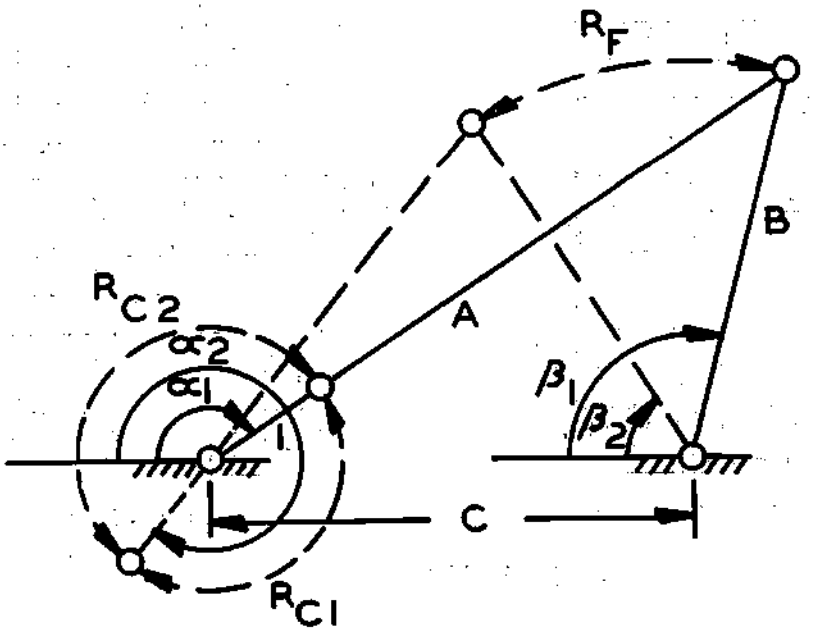
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

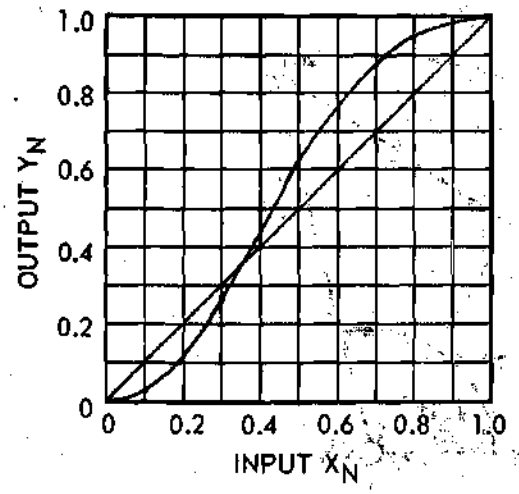
C = 2.5



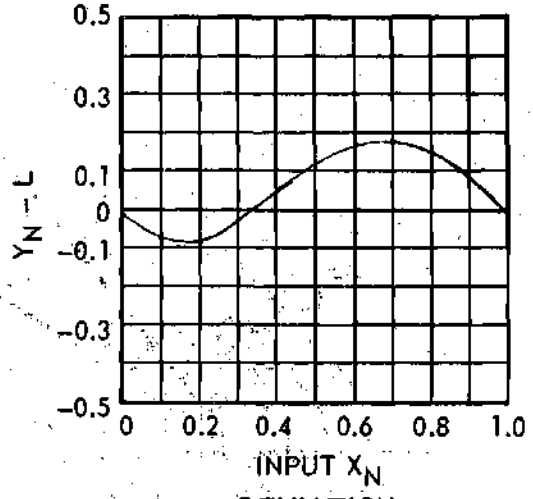
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.655701	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 3.0	$R_{C2} = 2\pi - R_{C1} =$ 3.627484	= 0.802361

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.028776	-0.071224	0.020356	-0.079644
0.120392	-0.079608	0.077160	-0.122840
0.269377	-0.030623	0.165187	-0.134813
0.449037	0.049037	0.279557	-0.120443
0.623993	0.123993	0.414485	-0.085515
0.769602	0.169602	0.562328	-0.037672
0.877327	0.177327	0.712689	0.012689
0.948504	0.148504	0.851086	0.051086
0.987809	0.087809	0.956740	0.056740
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

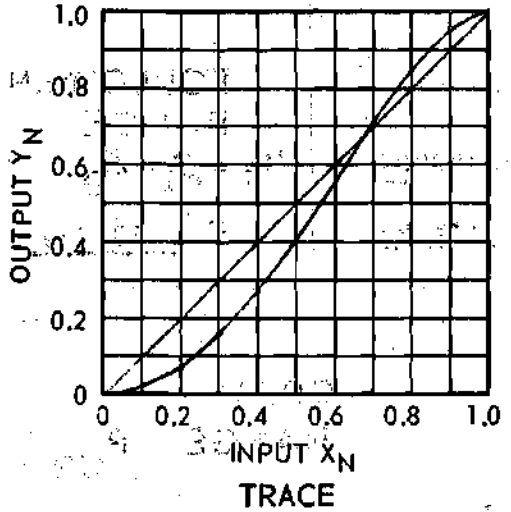


TRACE

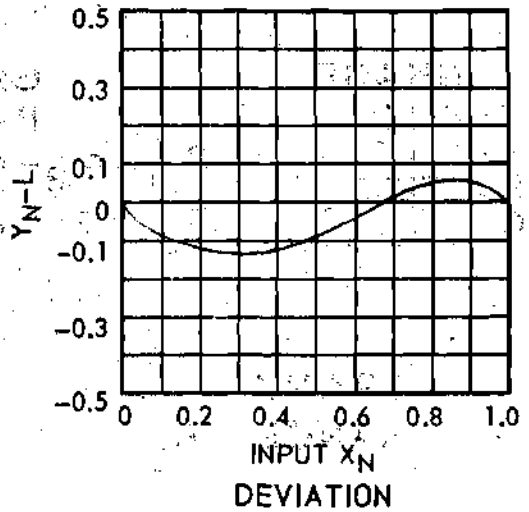


DEVIATION

CRANK RANGE RC1



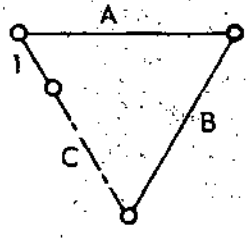
TRACE



DEVIATION

CRANK RANGE RC2

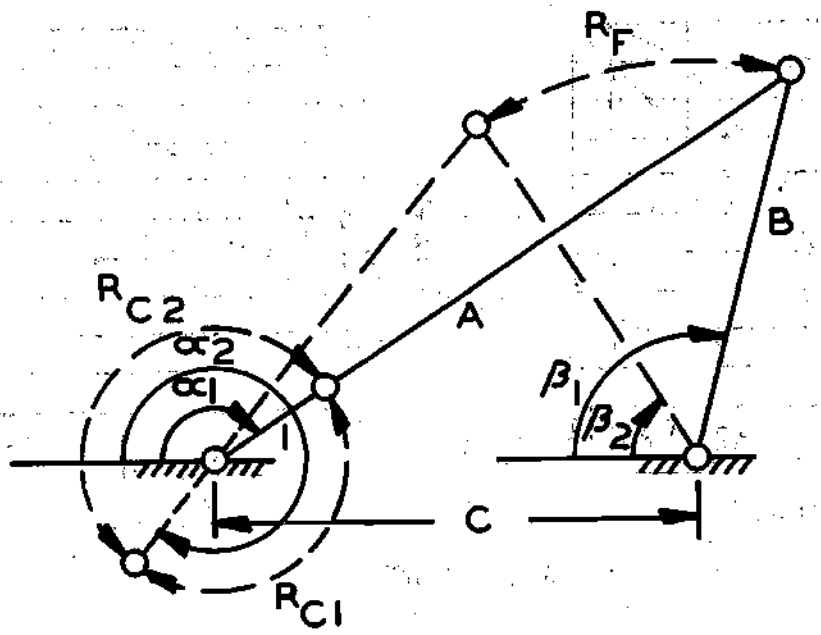
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

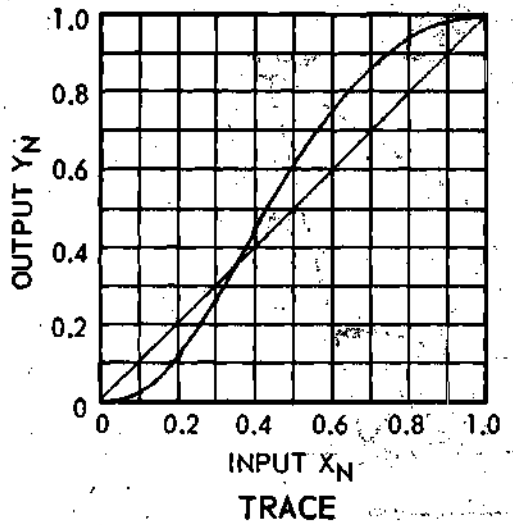
C = 3.0



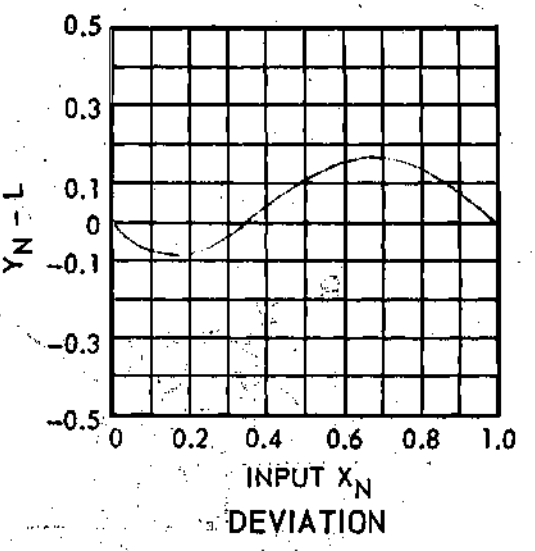
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.788901	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.494284	= 0.705384
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.029808	-0.070192	0.019736	-0.080264
0.121943	-0.078057	0.076116	-0.123884
0.267825	-0.032175	0.165110	-0.134890
0.441795	0.041795	0.281989	-0.118011
0.612607	0.112607	0.420297	-0.079703
0.757958	0.157958	0.571147	-0.028853
0.868568	0.168568	0.722659	0.022659
0.943790	0.143790	0.859182	0.059182
0.986464	0.086464	0.960187	0.060187
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

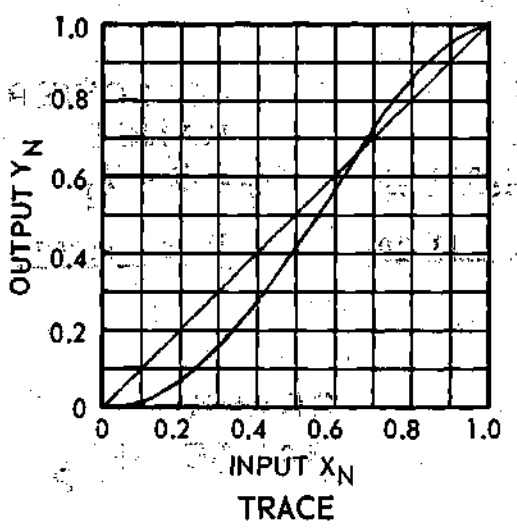


TRACE

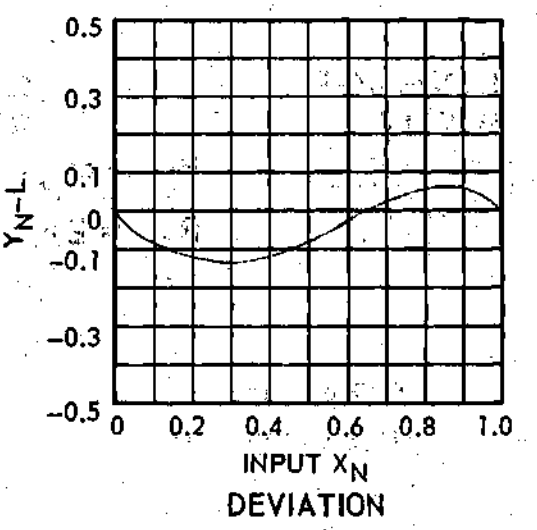


DEVIATION

CRANK RANGE RC1



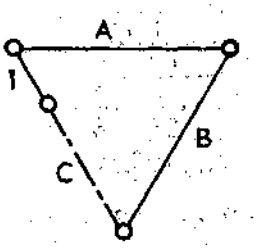
TRACE



DEVIATION

CRANK RANGE RC2

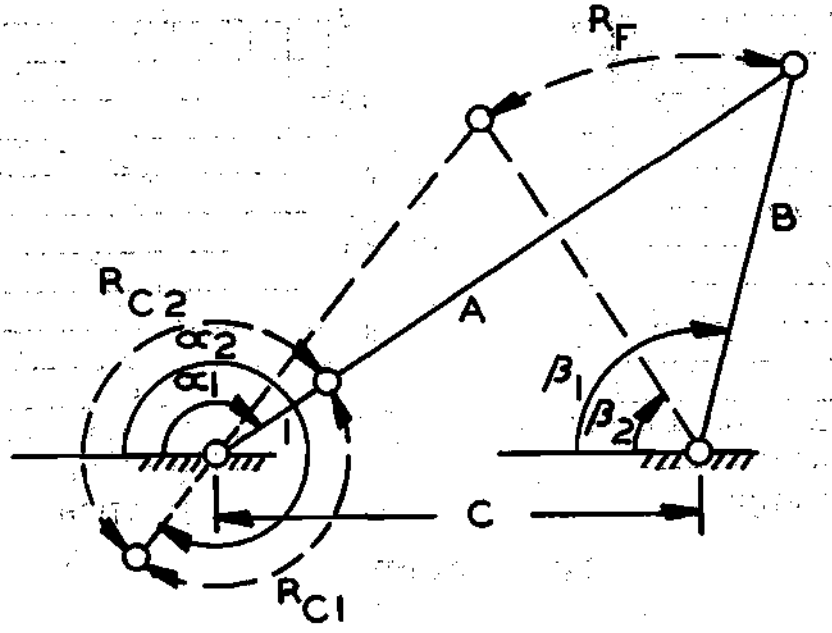
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

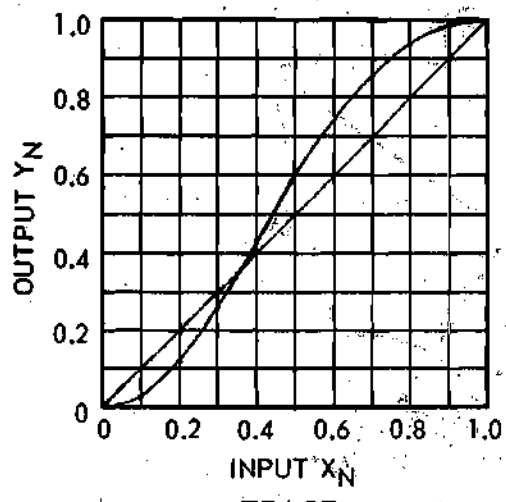
C = 3.5



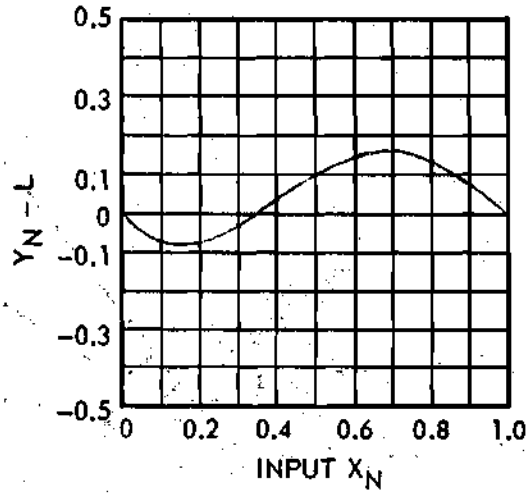
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.899665	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.383520	= 0.641707
C = 4.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.030675	-0.069325	0.019326	-0.080674
0.123333	-0.076667	0.075638	-0.124362
0.267010	-0.032990	0.165885	-0.134115
0.436678	0.036678	0.285348	-0.114652
0.603985	0.103985	0.426785	-0.073215
0.748614	0.148614	0.580054	-0.019946
0.861150	0.161150	0.731998	0.031998
0.939600	0.139600	0.866241	0.066241
0.985216	0.085216	0.962977	0.062977
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

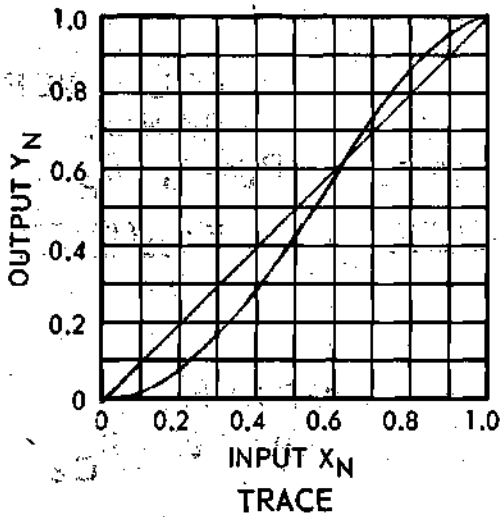


TRACE

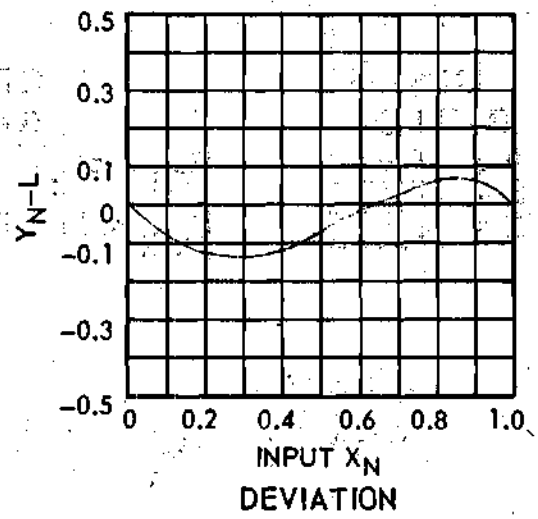


DEVIATION

CRANK RANGE RC1



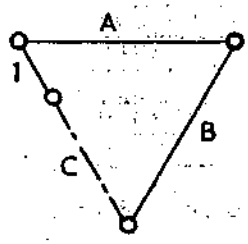
TRACE



DEVIATION

CRANK RANGE RC2

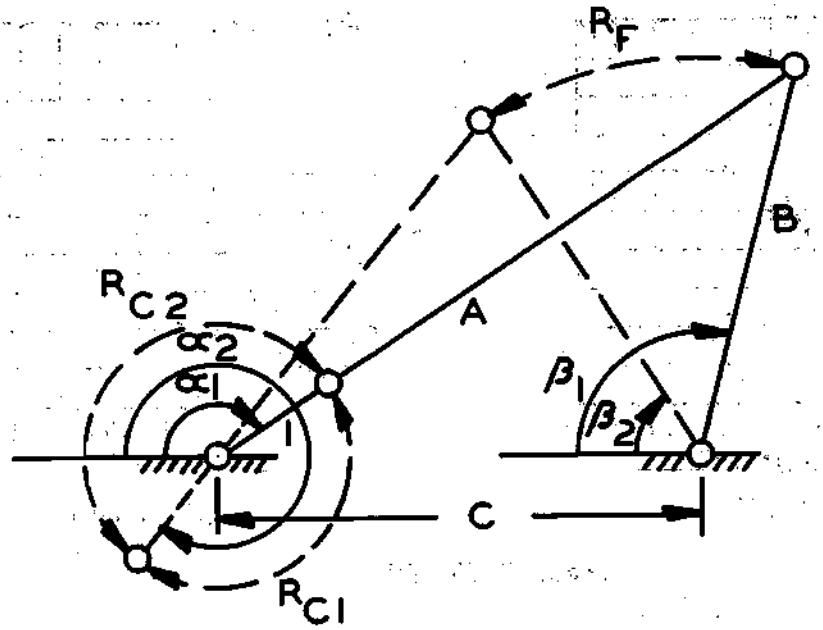
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

C = 4.0



LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.999457	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 4.5	$R_{C2} = 2\pi - R_{C1} =$ 3.283728	= 0.601679

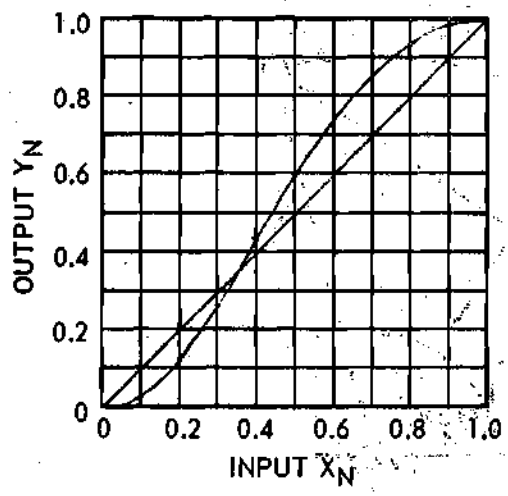
CRANK RANGE R_{C1}

Y_{N1}	DEVIATION
0.031365	-0.068635
0.124301	-0.075699
0.265949	-0.034051
0.431843	0.031843
0.595962	0.095962
0.739734	0.139734
0.853868	0.153868
0.935339	0.135339
0.983903	0.083903
1.000000	0.000000

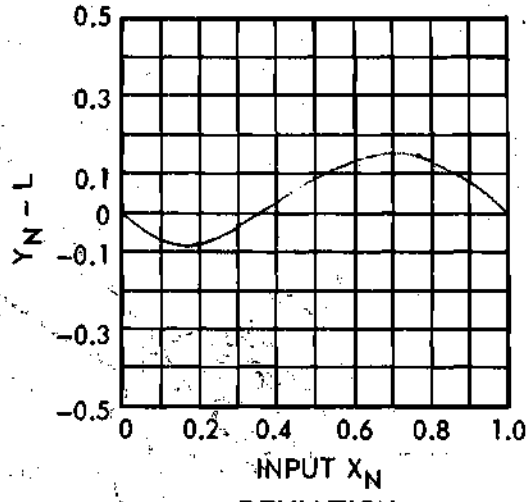
CRANK RANGE R_{C2}

Y_{N2}	DEVIATION
0.019133	-0.080867
0.075884	-0.124116
0.167994	-0.132005
0.290508	-0.109492
0.435131	-0.064869
0.590355	-0.009645
0.741930	0.041930
0.873202	0.073202
0.965533	0.065533
1.000000	0.000000

All angles measured in radians.

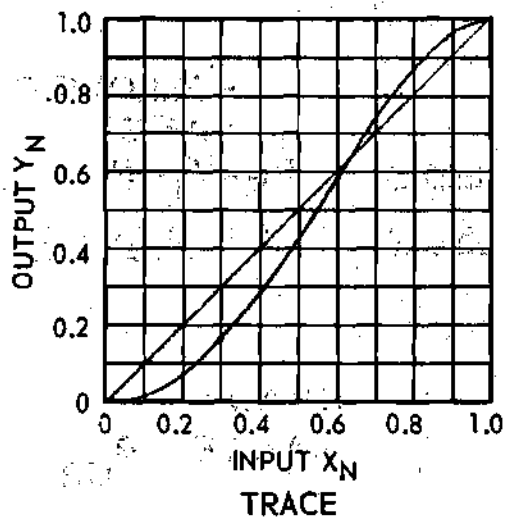


TRACE

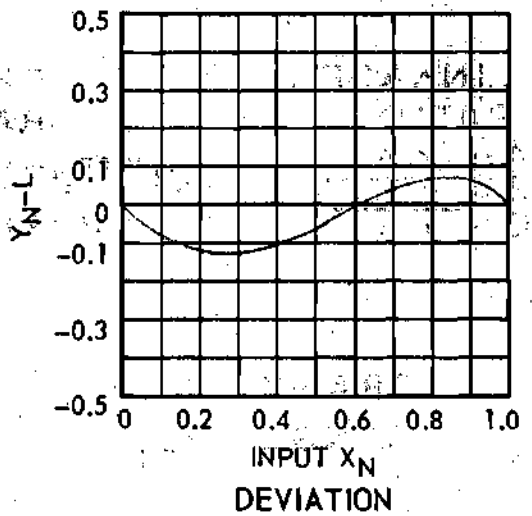


DEVIATION

CRANK RANGE RC1



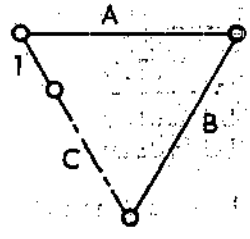
TRACE



DEVIATION

CRANK RANGE RC2

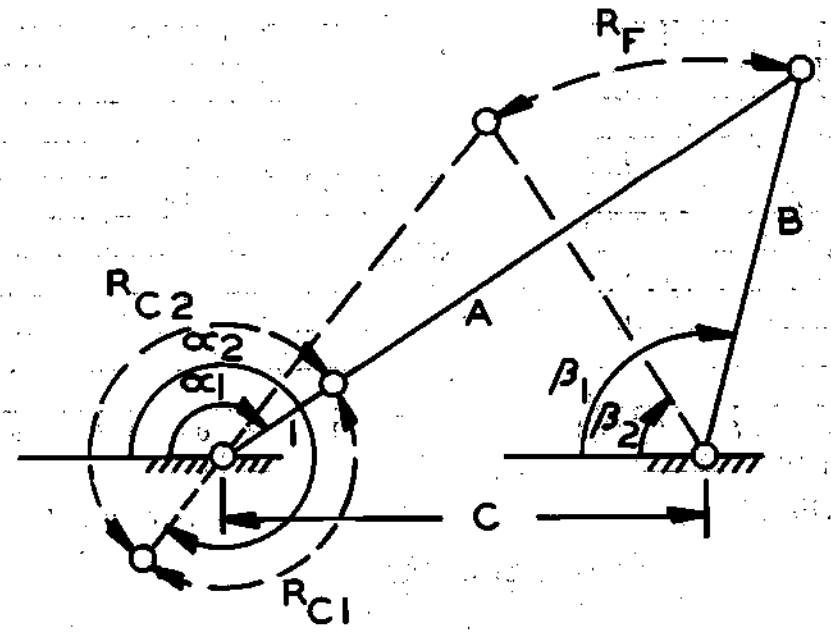
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

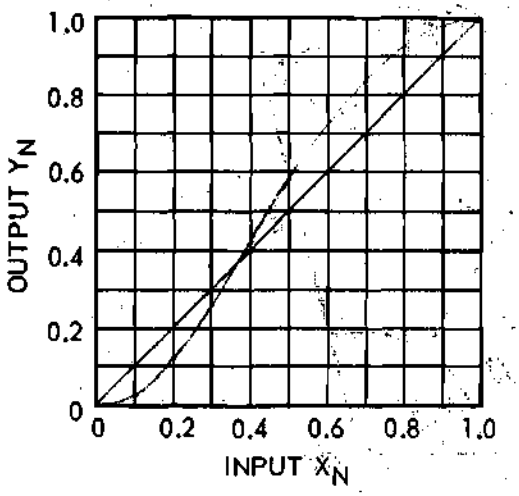
C = 4.5



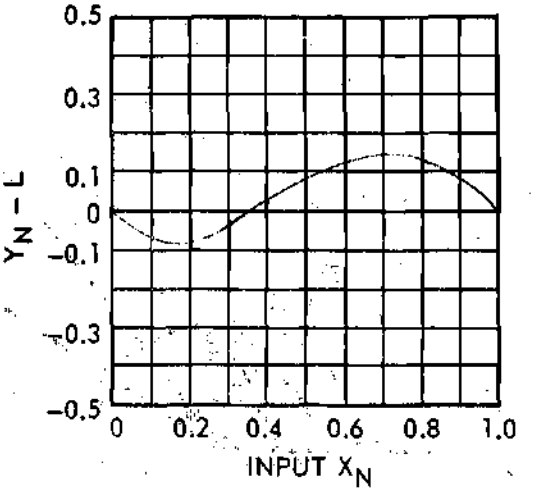
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.096973	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.186212	= 0.581725
C = 5.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031851	-0.068149	0.019236	-0.080764
0.124627	-0.075373	0.077275	-0.122725
0.263948	-0.036052	0.172424	-0.127575
0.426013	0.026013	0.298992	-0.101007
0.586921	0.086921	0.447116	-0.052884
0.729766	0.129766	0.603738	0.003738
0.845538	0.145538	0.753777	0.053777
0.930327	0.130327	0.880882	0.080882
0.982313	0.082313	0.968157	0.068157
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

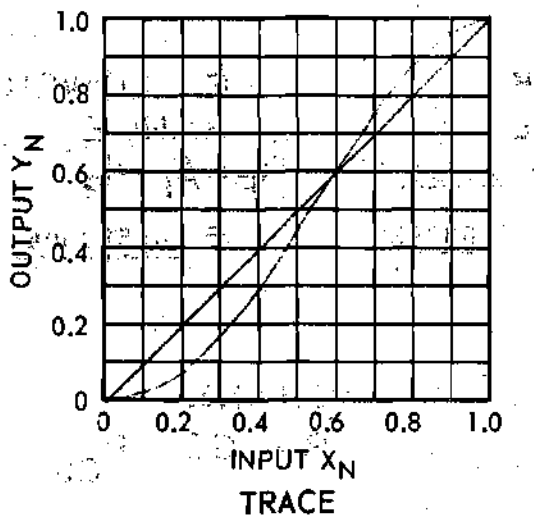


TRACE

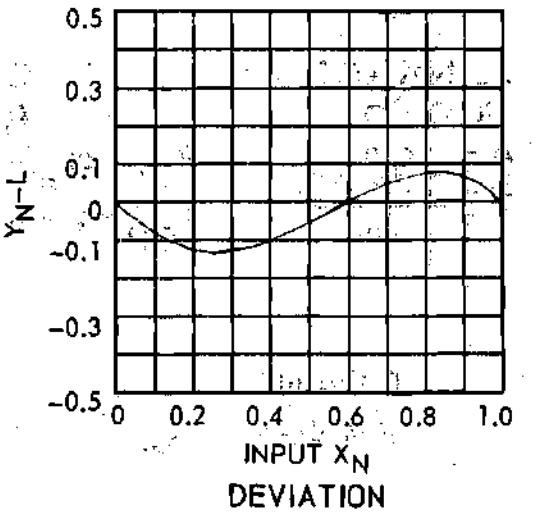


DEVIATION

CRANK RANGE RC1



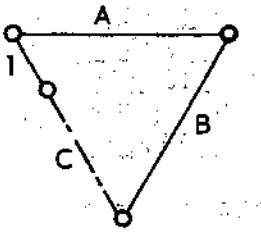
TRACE



DEVIATION

CRANK RANGE RC2

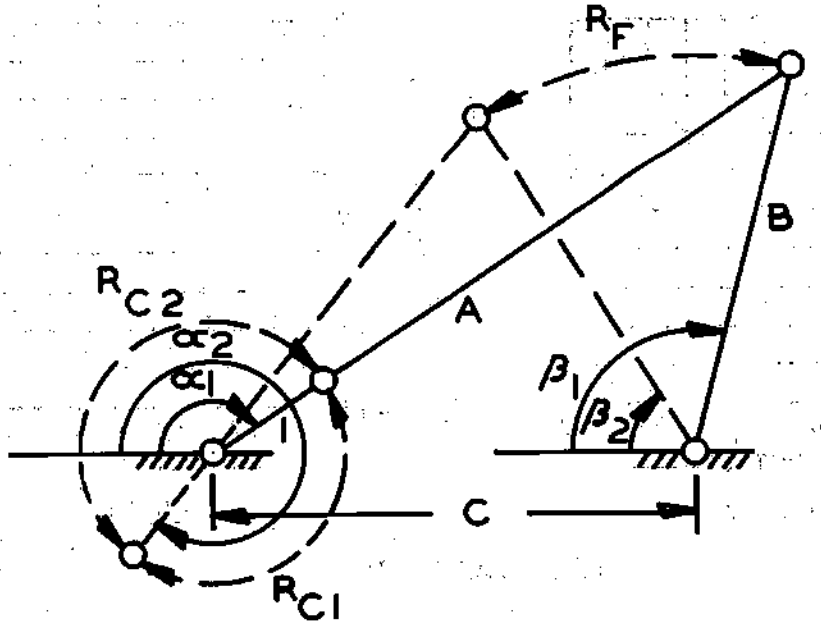
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

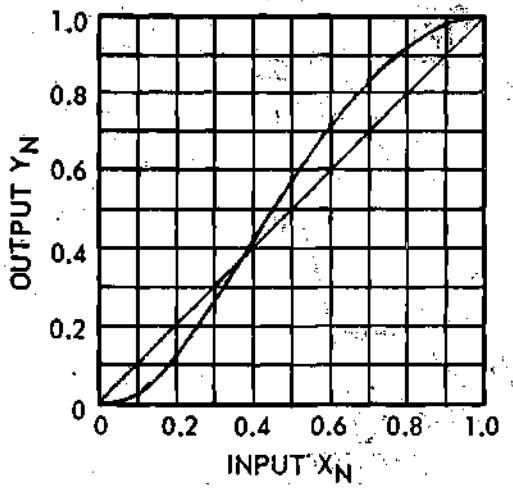
C = 5.0



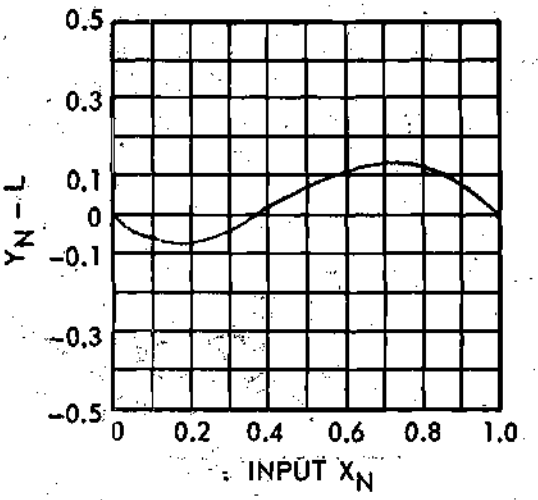
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.202258	$R_F = \beta_1 - \beta_2$
B = 3.5	$R_{C2} = 2\pi - R_{C1} =$ 3.080927	= 0.583604
C = 5.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.032042	-0.067958	0.019911	-0.080089
0.123896	-0.076104	0.081047	-0.118953
0.259996	-0.040004	0.181758	-0.118242
0.417472	0.017471	0.314408	-0.085592
0.574630	0.074630	0.466545	-0.033455
0.716358	0.116358	0.623415	0.023415
0.834137	0.134137	0.769739	0.069739
0.923256	0.123256	0.890436	0.090436
0.979992	0.079992	0.971190	0.071190
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

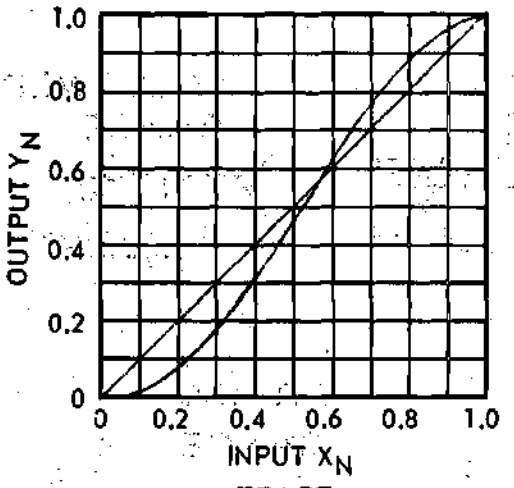


TRACE

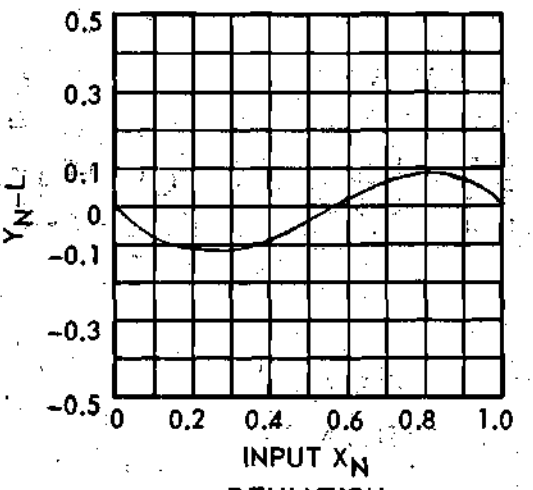


DEVIATION

CRANK RANGE RC1



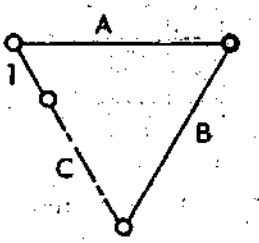
TRACE



DEVIATION

CRANK RANGE RC2

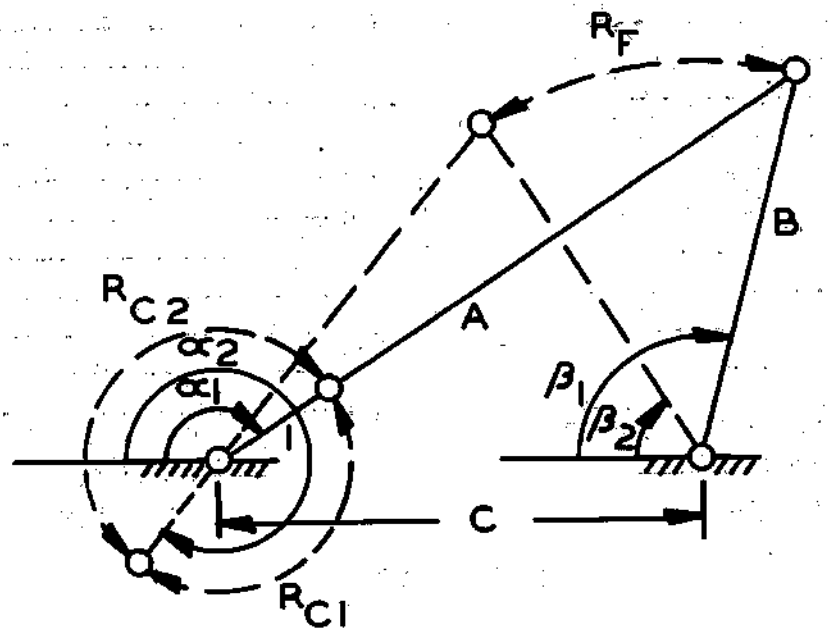
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

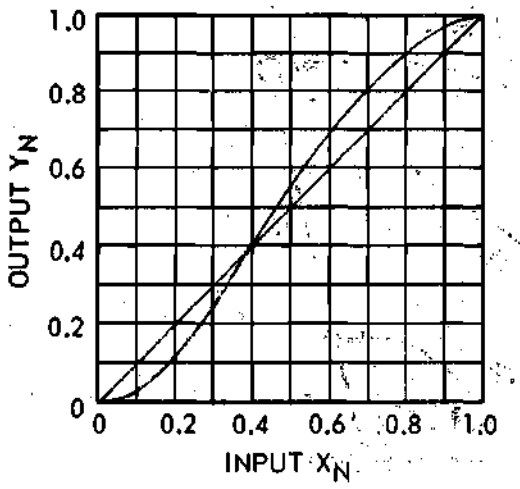
C = 5.5



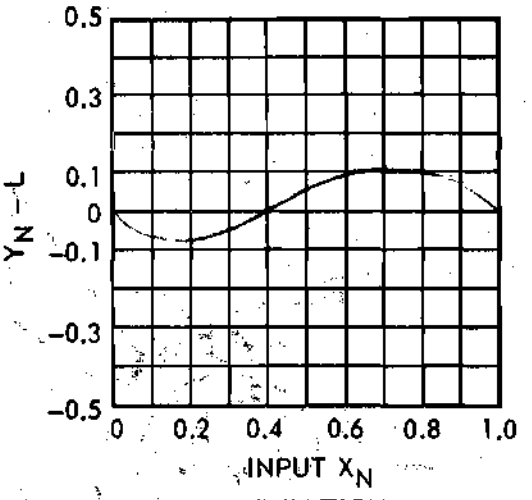
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.335779	$R_F = \beta_1 - \beta_2$
B = 3.5		
C = 6.0	$R_{C2} = 2\pi - R_{C1} =$ 2.947406	= 0.620272

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031653	-0.068347	0.022423	-0.077577
0.120938	-0.079062	0.092401	-0.107599
0.251530	-0.048470	0.205772	-0.094228
0.402031	0.002031	0.348854	-0.051146
0.553496	0.053496	0.504798	0.004798
0.693199	0.093199	0.658074	0.058074
0.813723	0.113723	0.795244	0.095244
0.909868	0.109868	0.904443	0.104443
0.975301	0.075301	0.975312	0.075312
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

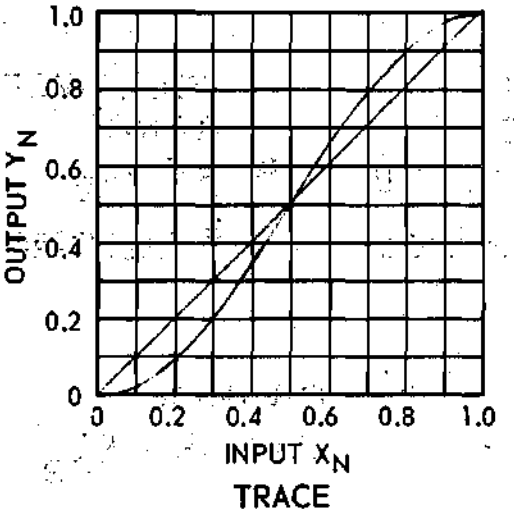


TRACE

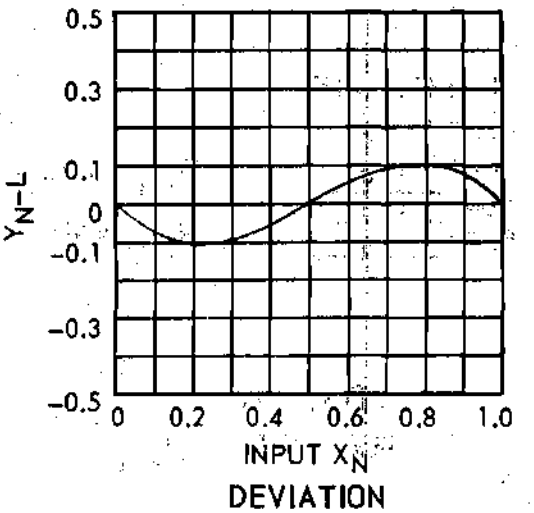


DEVIATION

CRANK RANGE RC1



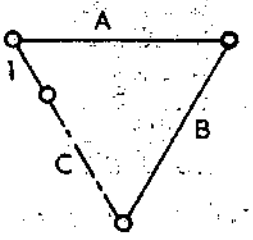
TRACE



DEVIATION

CRANK RANGE RC2

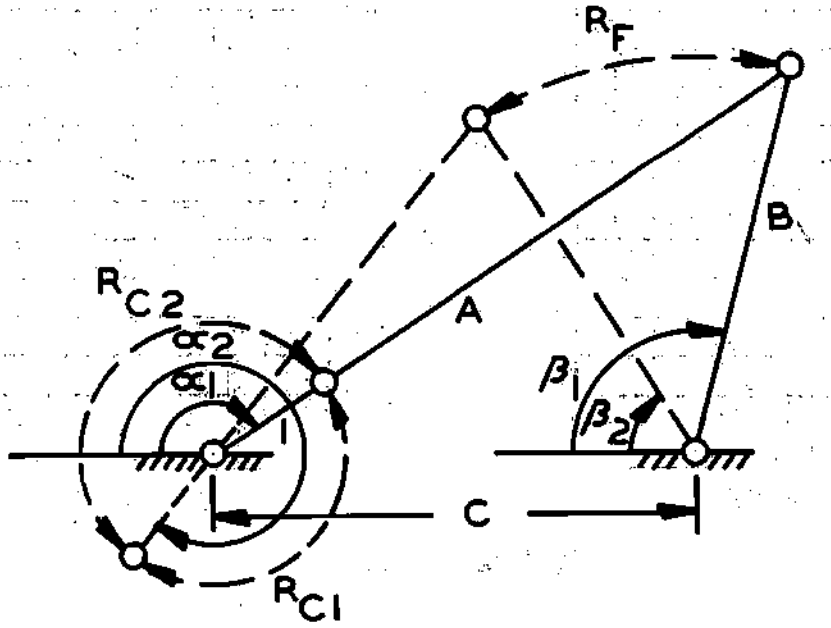
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 3.5

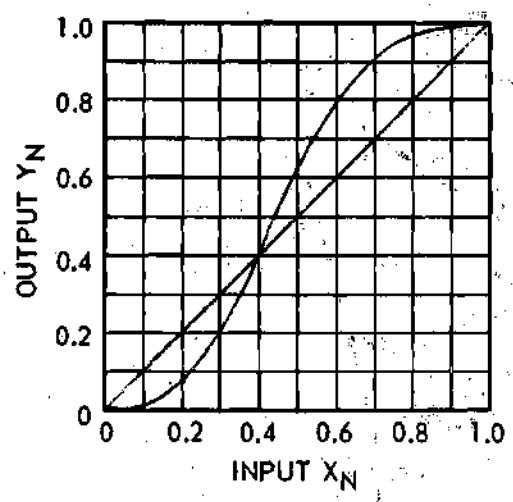
C = 6.0



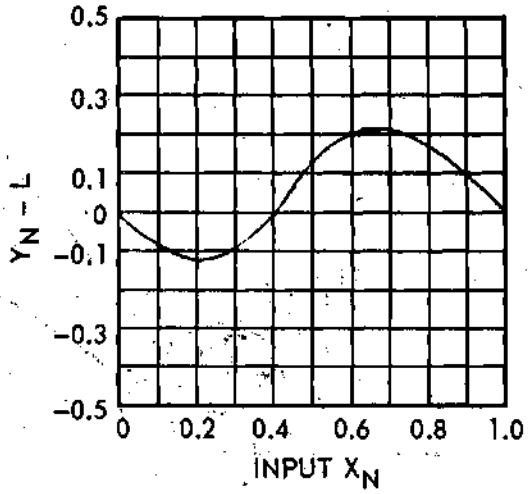
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 1.737548	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 4.545637	= 1.477555
C = 1.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.015393	-0.084607	0.030911	-0.069089
0.074736	-0.125264	0.100201	-0.099799
0.202987	-0.097013	0.191833	-0.108167
0.409303	0.009303	0.299751	-0.100249
0.637164	0.137164	0.420666	-0.079334
0.809087	0.209087	0.551492	-0.048508
0.912332	0.212332	0.687907	-0.012093
0.967570	0.167570	0.822516	0.022516
0.993091	0.093091	0.940126	0.040126
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

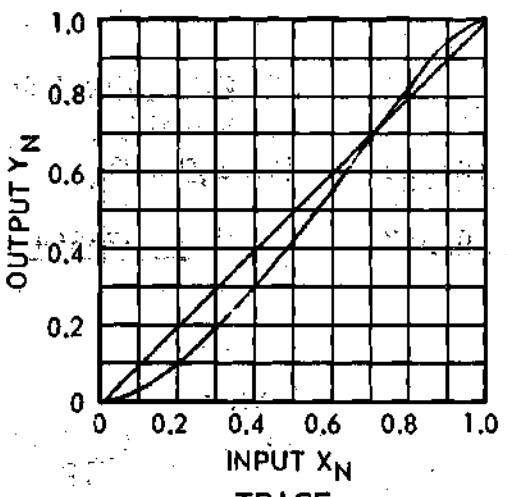


TRACE

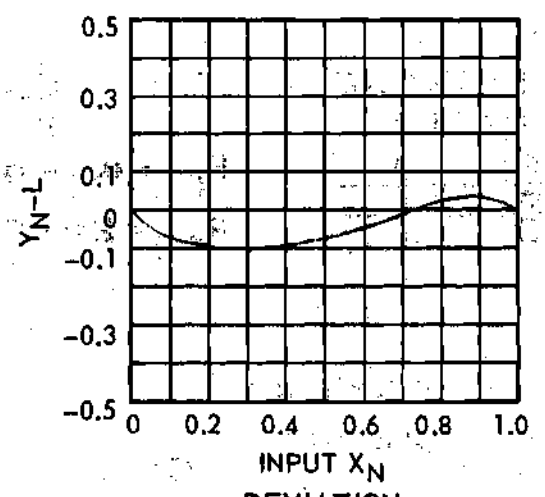


DEVIATION

CRANK RANGE RC1



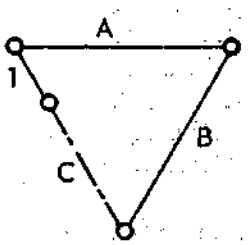
TRACE



DEVIATION

CRANK RANGE RC2

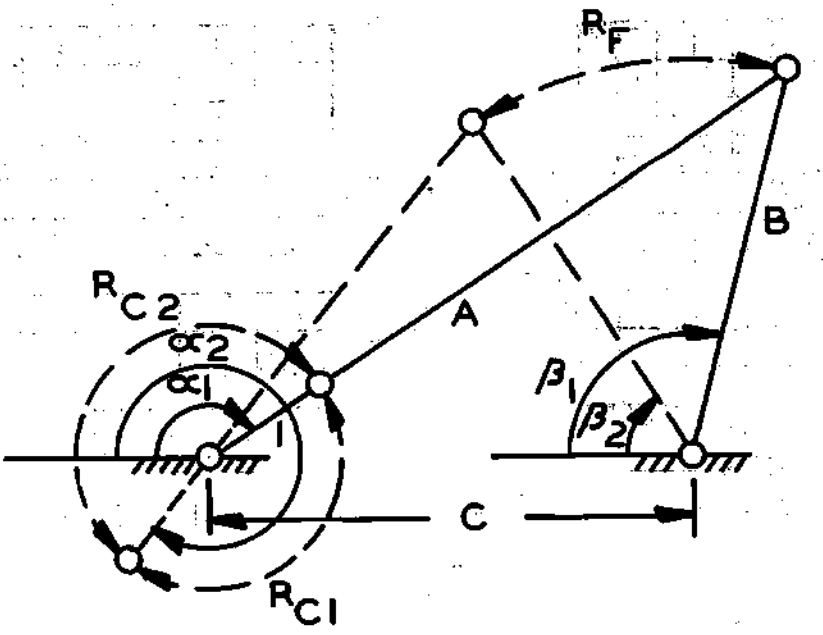
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

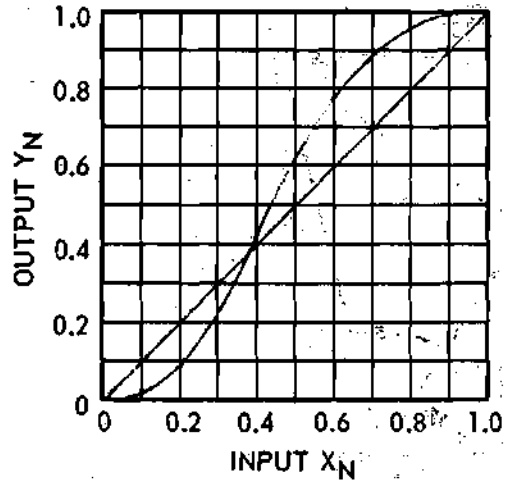
C = 1.5



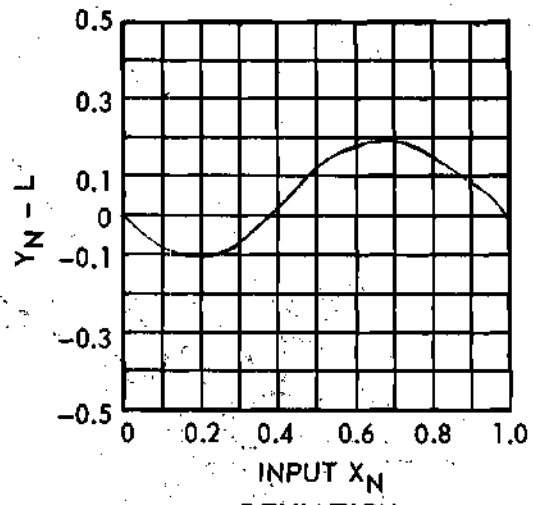
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.181328	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 4.101857	= 1.075864
C = 2.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.020757	-0.079243	0.025638	-0.074362
0.093818	-0.106182	0.089664	-0.110336
0.230827	-0.069173	0.180555	-0.119445
0.420574	0.020574	0.292144	-0.107856
0.618923	0.118923	0.419789	-0.080211
0.780691	0.180691	0.558509	-0.041491
0.891186	0.191186	0.701465	0.001465
0.957311	0.157311	0.837989	0.037989
0.990494	0.090494	0.949517	0.049517
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

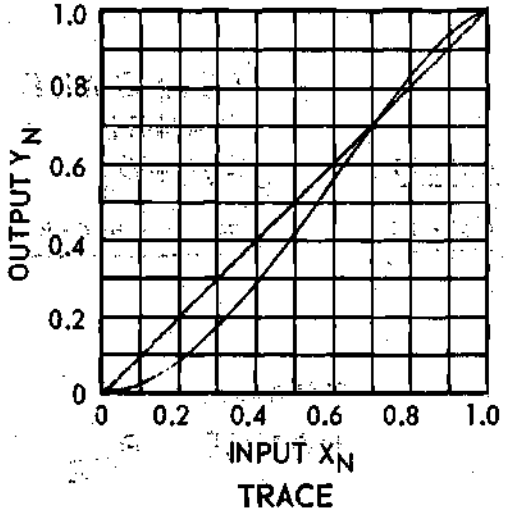


TRACE

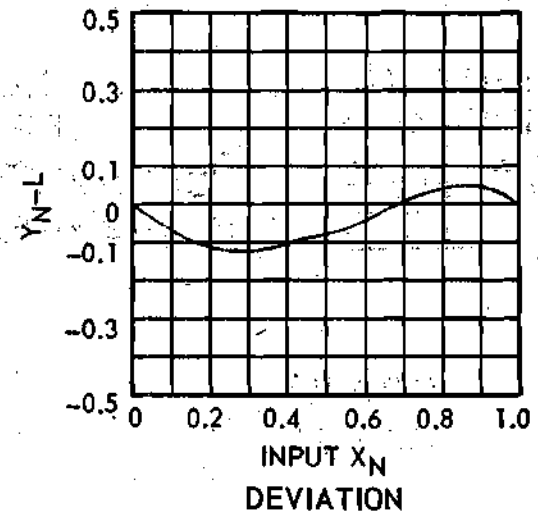


DEVIATION

CRANK RANGE RC1



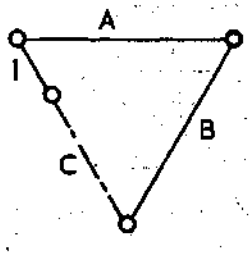
TRACE



DEVIATION

CRANK RANGE RC2

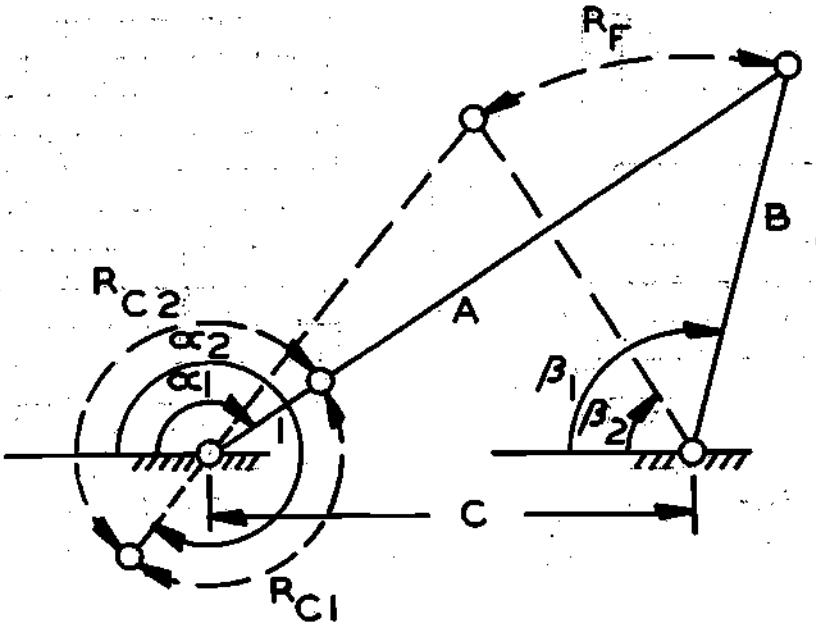
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

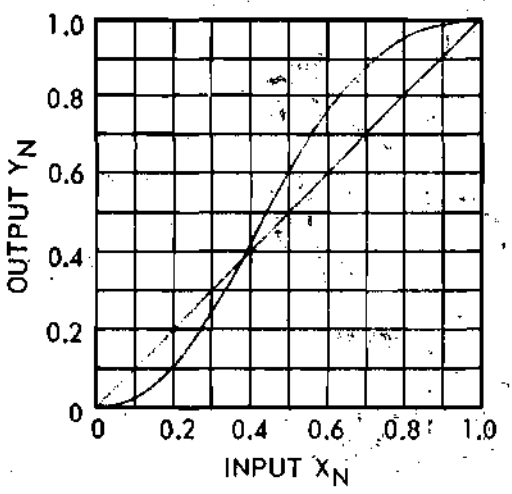
C = 2.0



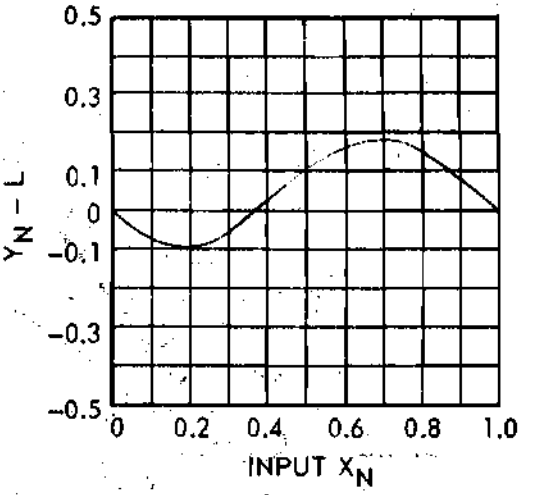
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.435511	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.847674	= 0.862088
C = 2.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.024013	-0.075987	0.023081	-0.076919
0.104024	-0.095976	0.084022	-0.115978
0.243612	-0.056388	0.174285	-0.125715
0.425111	0.025111	0.288042	-0.111958
0.610978	0.110978	0.419961	-0.080039
0.767080	0.167080	0.563668	-0.036332
0.879764	0.179764	0.710412	0.010412
0.951170	0.151170	0.847334	0.047334
0.988806	0.088806	0.954501	0.054501
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

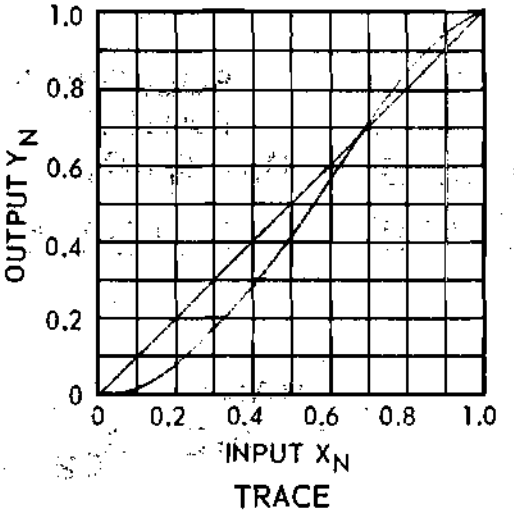


TRACE

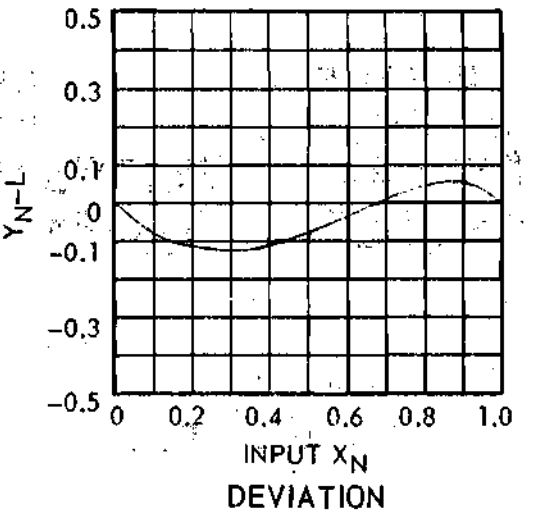


DEVIATION

CRANK RANGE R01



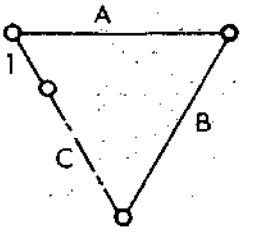
TRACE



DEVIATION

CRANK RANGE R02

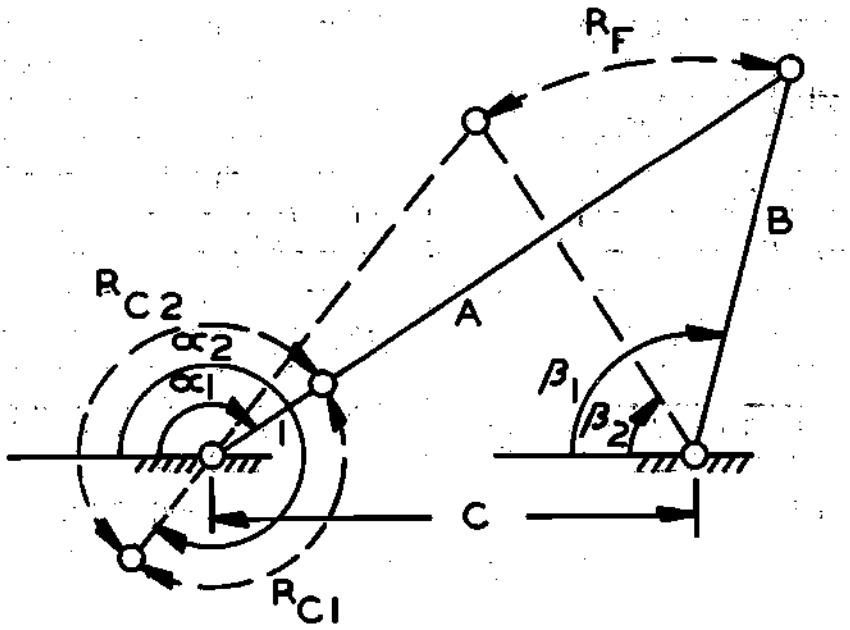
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

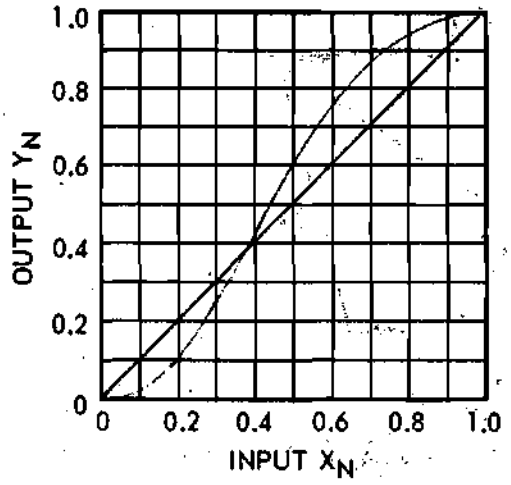
C = 2.5



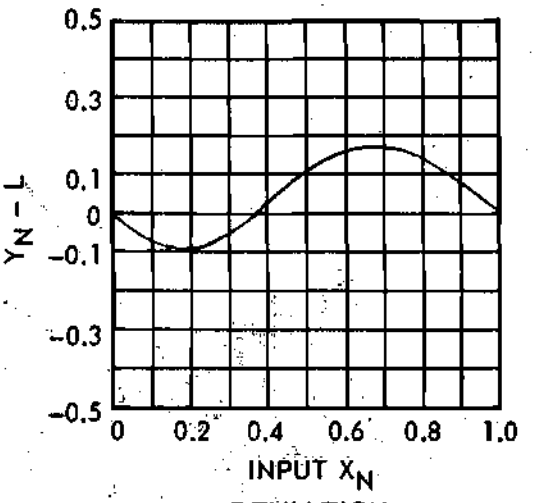
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 2.609432	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.673753	= 0.729728
C = 3.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.026265	-0.073735	0.021539	-0.078461
0.110538	-0.089462	0.080523	-0.119477
0.251057	-0.048943	0.170448	-0.129552
0.427332	0.027332	0.285923	-0.114077
0.605903	0.105903	0.421102	-0.078898
0.758347	0.158347	0.568449	-0.031551
0.872025	0.172025	0.717644	0.017644
0.946756	0.146756	0.854257	0.054257
0.987527	0.087527	0.957856	0.057856
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

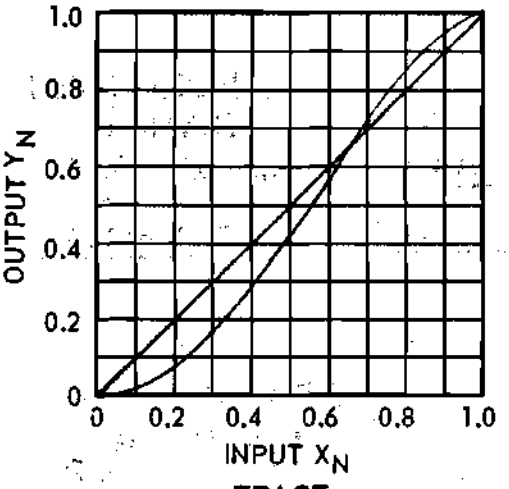


TRACE

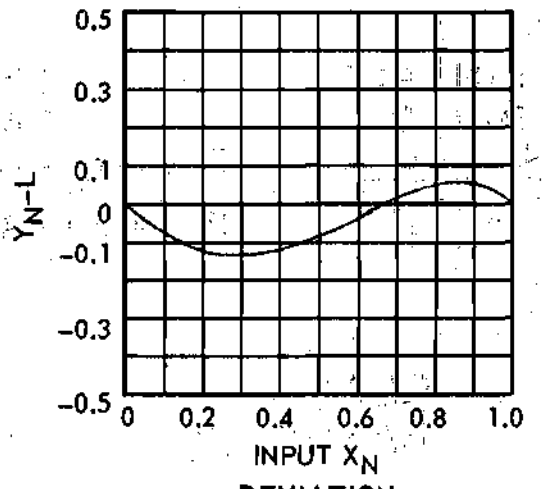


DEVIATION

CRANK RANGE RC1



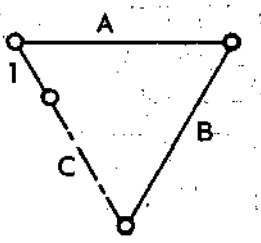
TRACE



DEVIATION

CRANK RANGE RC2

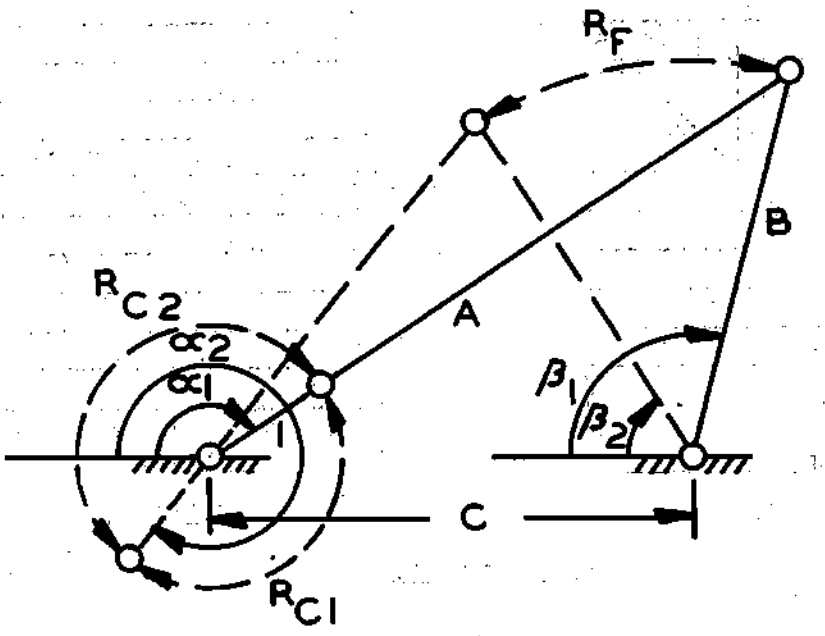
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

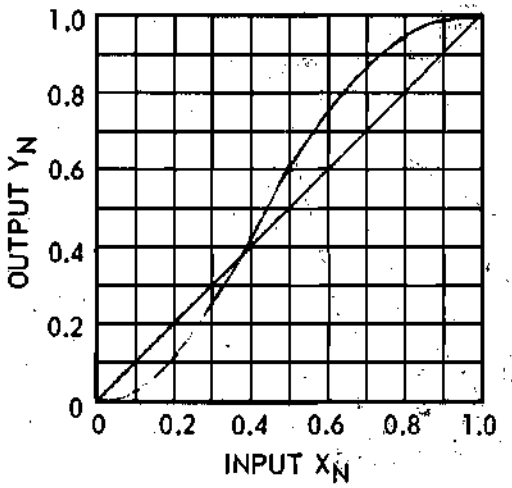
C = 3.0



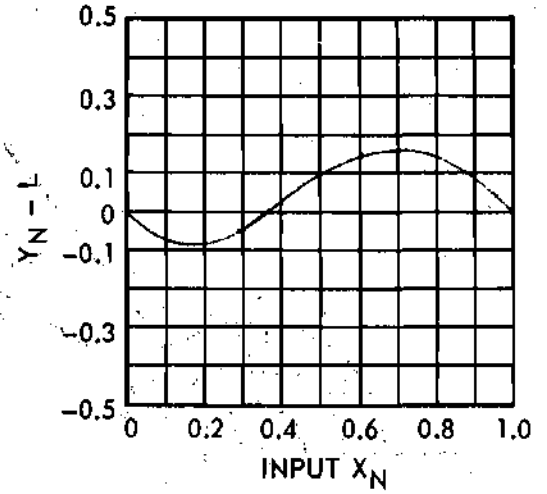
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 = 2.741813$	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} = 3.541372$	= 0.641707
C = 3.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.027940	-0.072060	0.020517	-0.079483
0.115080	-0.084920	0.078230	-0.121770
0.255824	-0.044176	0.168159	-0.131841
0.428257	0.028257	0.285274	-0.114726
0.601799	0.101799	0.423247	-0.076753
0.751629	0.151629	0.573471	-0.026529
0.865934	0.165934	0.724273	0.024273
0.943156	0.143156	0.860075	0.060075
0.986445	0.086445	0.960451	0.060451
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

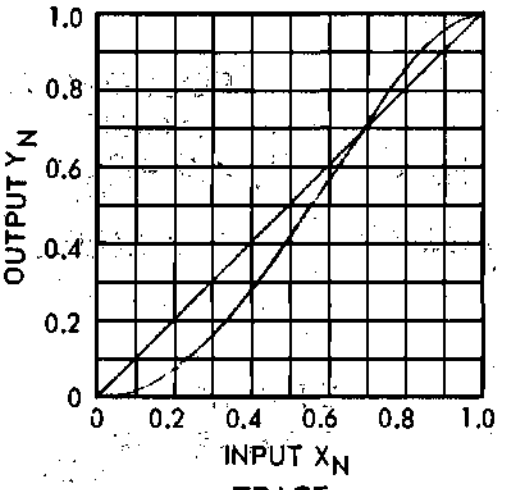


TRACE

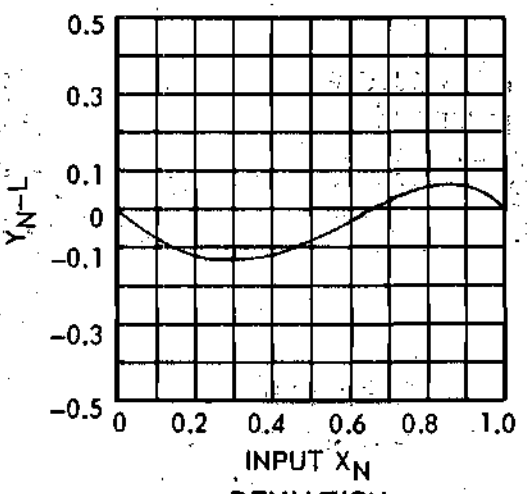


DEVIATION

CRANK RANGE RC1



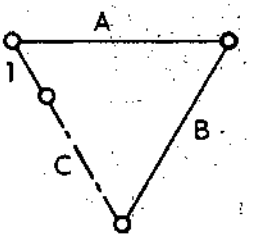
TRACE



DEVIATION

CRANK RANGE RC2

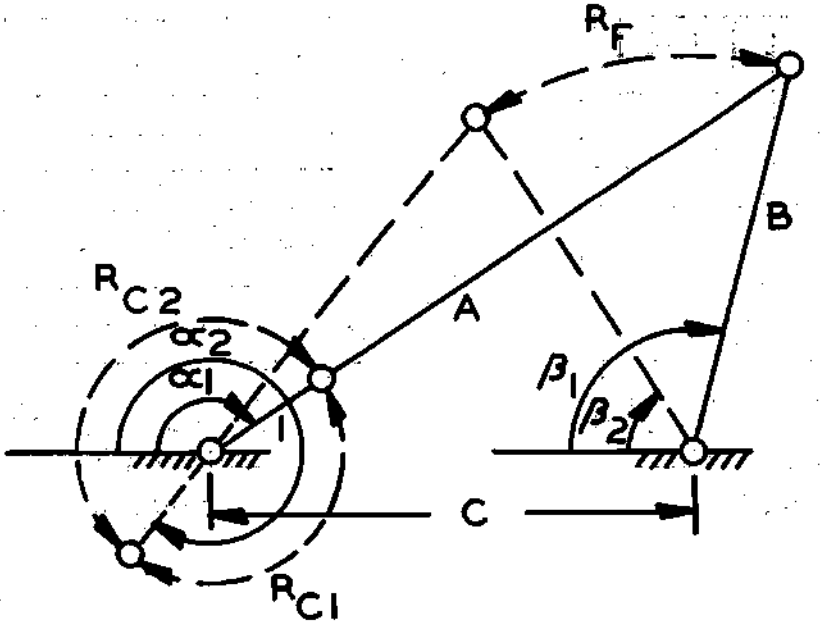
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

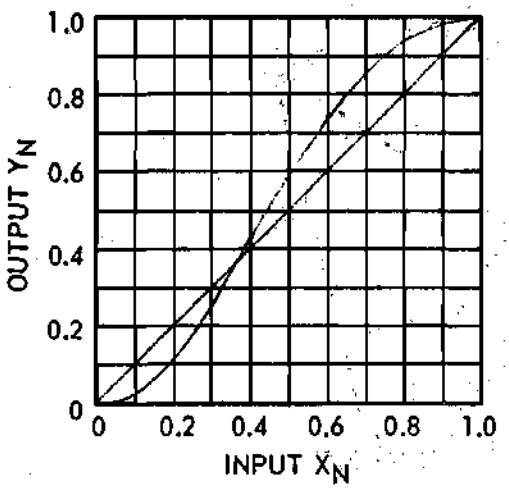
C = 3.5



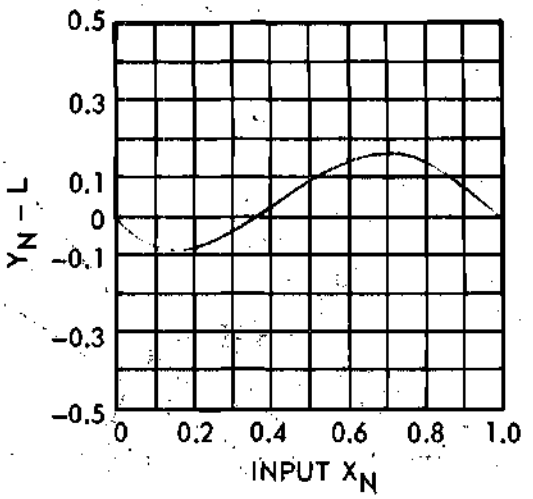
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 = 2.850858$	$R_F = \beta_1 - \beta_2$
B = 4.0		
C = 4.0	$R_{C2} = 2\pi - R_{C1} = 3.432327$	$= 0.581470$

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.029240	-0.070760	0.019817	-0.080183
0.118383	-0.081617	0.076776	-0.123224
0.258912	-0.041088	0.167099	-0.132901
0.428180	0.028180	0.285994	-0.114006
0.597847	0.097847	0.426587	-0.073413
0.745673	0.145673	0.579201	-0.020799
0.860524	0.160524	0.730956	0.030956
0.939888	0.139888	0.865460	0.065460
0.985436	0.085436	0.962674	0.062674
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

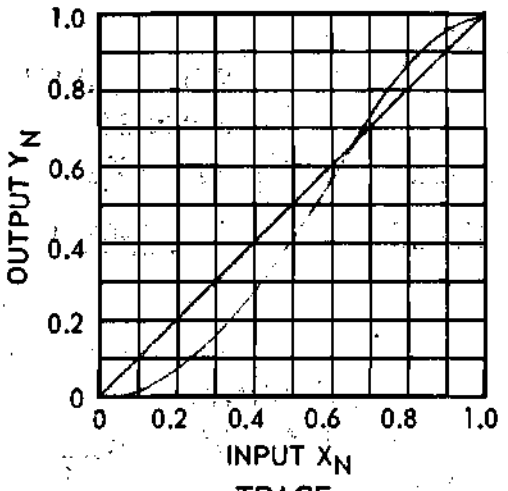


TRACE

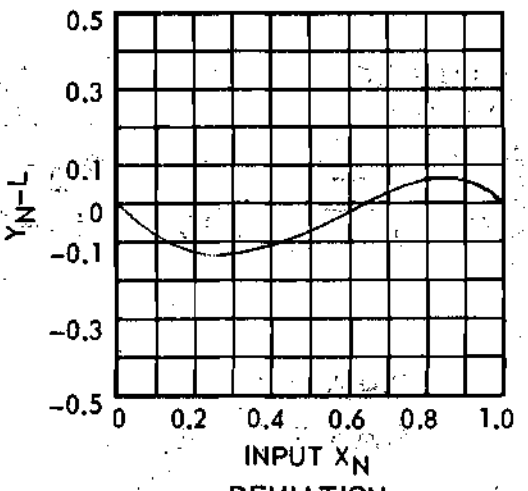


DEVIATION

CRANK RANGE RC1



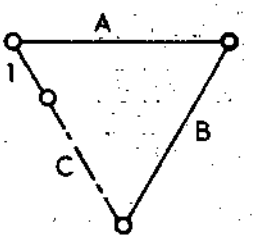
TRACE



DEVIATION

CRANK RANGE RC2

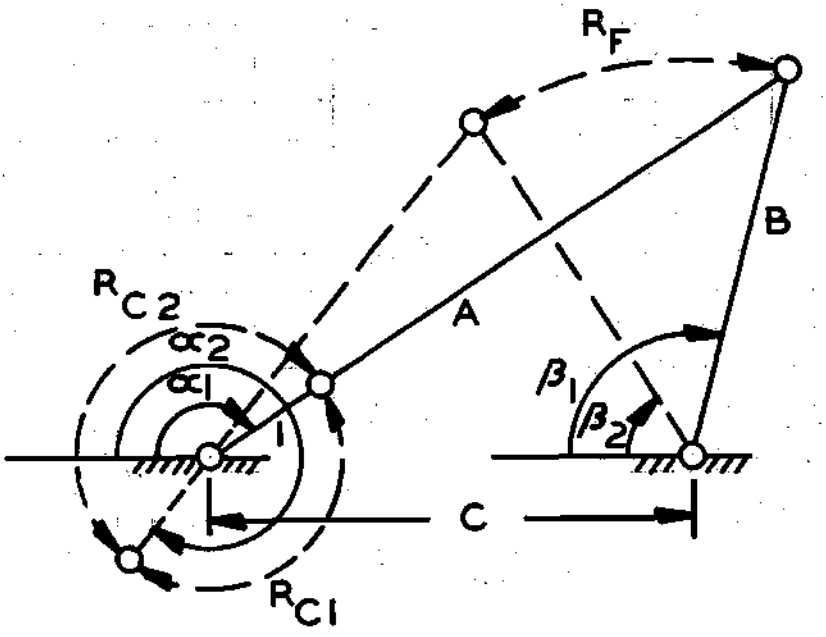
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

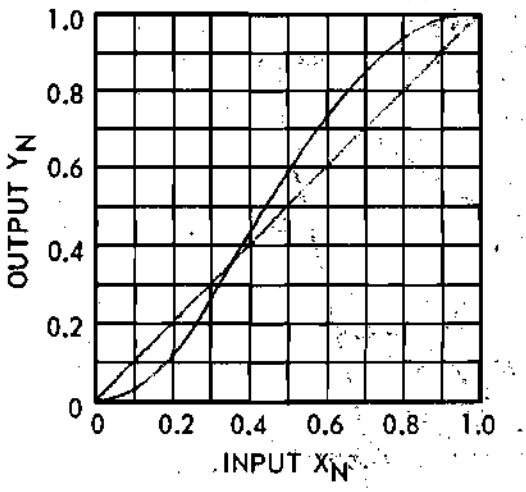
C = 4.0



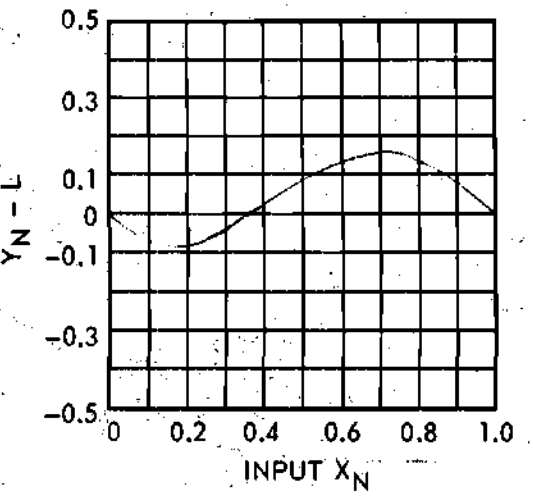
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 = 2.946948$	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} = 3.336237$	= 0.540801
C = 4.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.030266	-0.069734	0.019358	-0.080642
0.120781	-0.079219	0.076045	-0.123955
0.260714	-0.039286	0.167260	-0.132740
0.427100	0.027100	0.288282	-0.111718
0.593496	0.093496	0.431527	-0.068473
0.739699	0.139699	0.586176	-0.013824
0.855155	0.155155	0.738255	0.038255
0.936606	0.136606	0.870875	0.070875
0.984404	0.084404	0.964753	0.064753
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

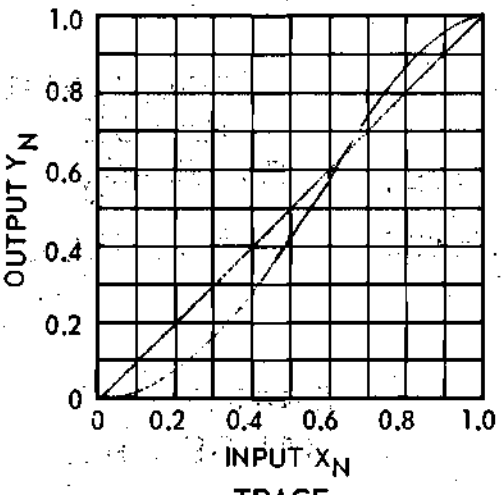


TRACE

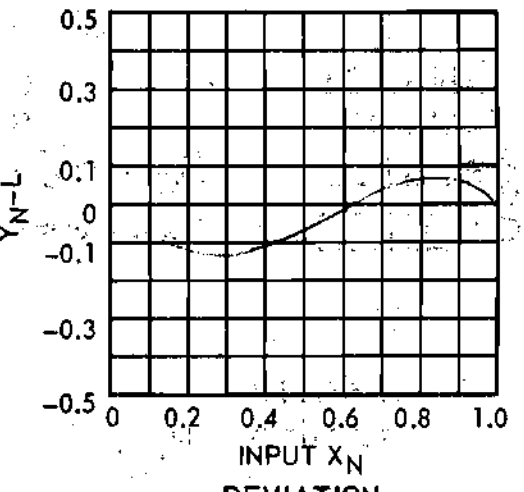


DEVIATION

CRANK RANGE RC1



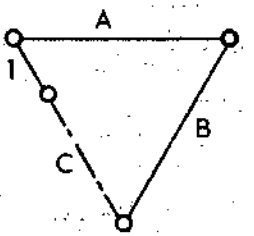
TRACE



DEVIATION

CRANK RANGE RC2

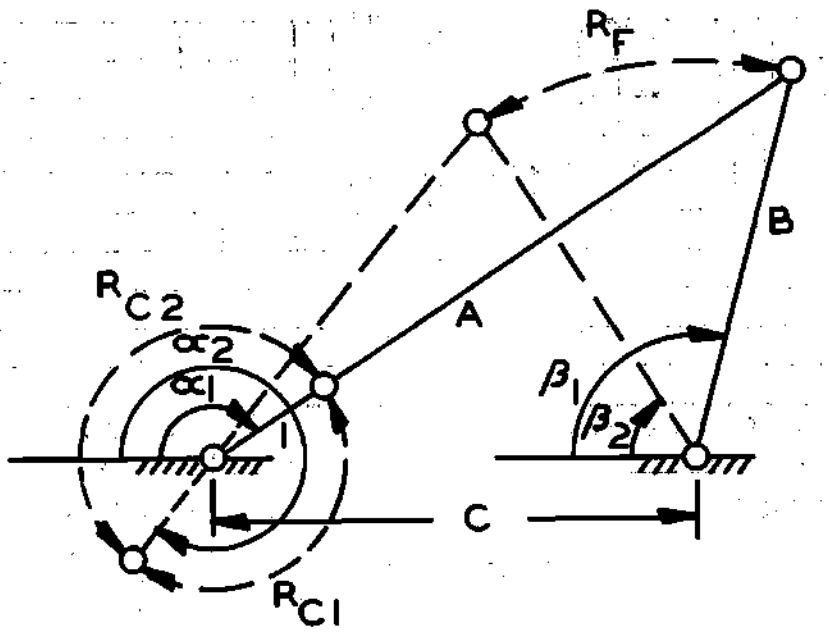
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

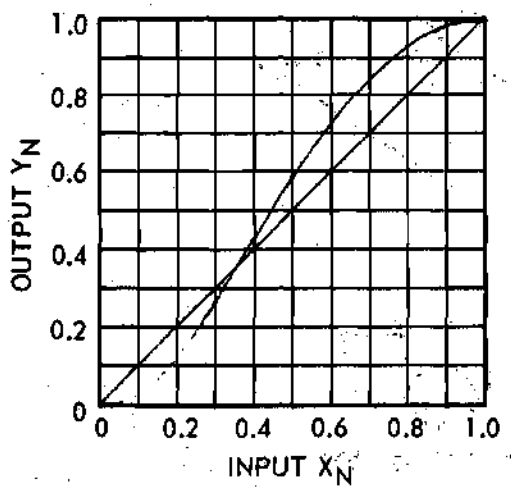
C = 4.5



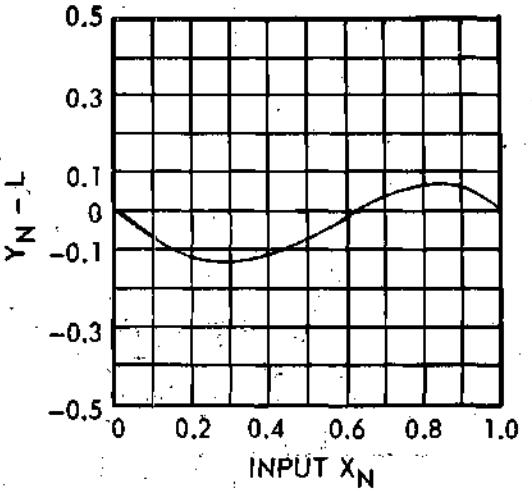
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.037331	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.245854	= 0.515778
C = 5.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031062	-0.068938	0.019130	-0.080870
0.122398	-0.077602	0.076117	-0.123883
0.261295	-0.038705	0.168958	-0.131042
0.424781	0.024781	0.292734	-0.107266
0.588159	0.088159	0.438853	-0.061147
0.732978	0.132978	0.595203	-0.004797
0.849210	0.149210	0.746842	0.046842
0.932946	0.132946	0.876764	0.076764
0.983235	0.083235	0.966859	0.066859
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

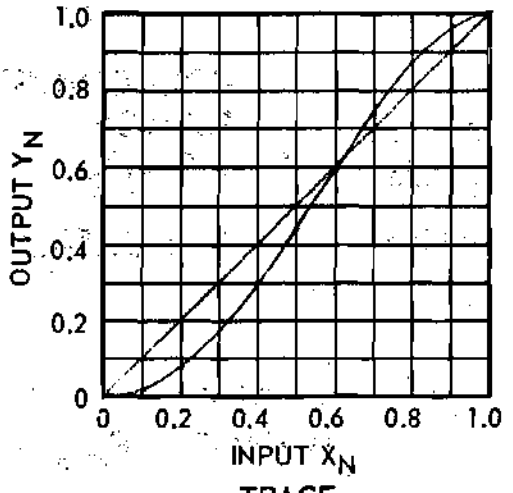


TRACE

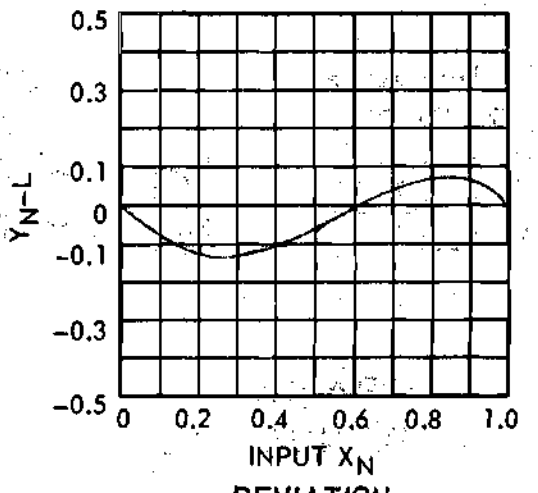


DEVIATION

CRANK RANGE RC1



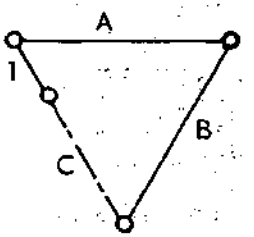
TRACE



DEVIATION

CRANK RANGE RC2

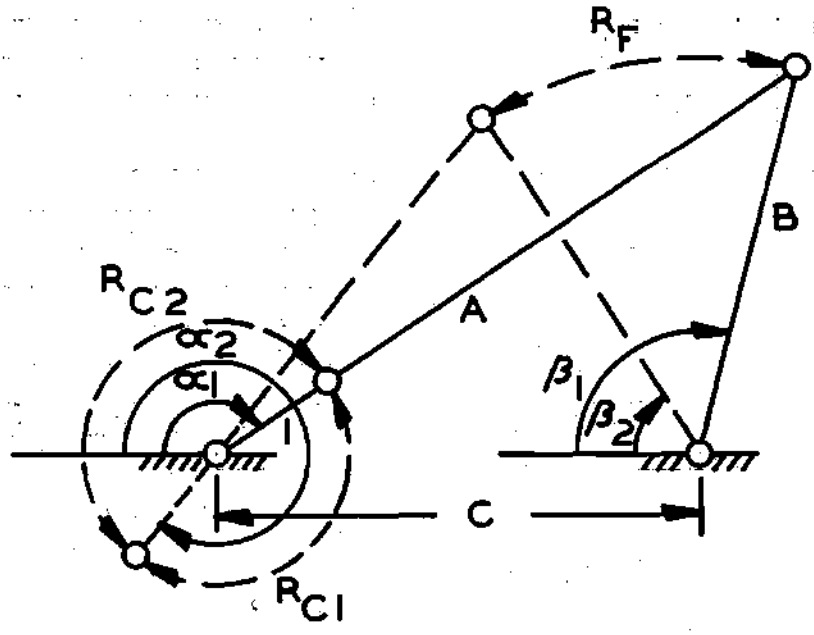
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

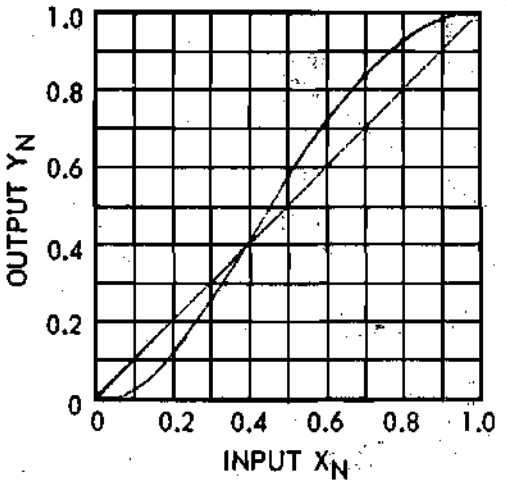
C = 5.0



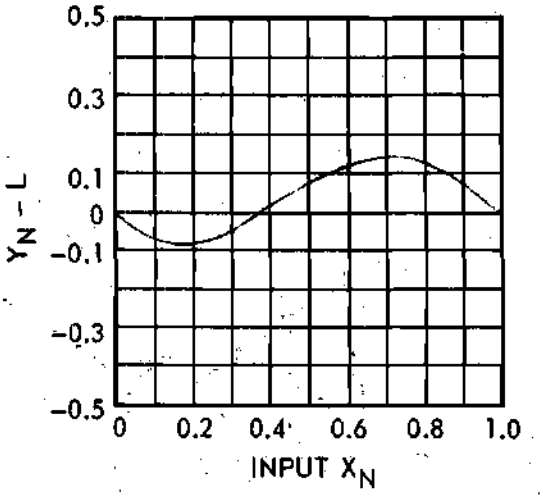
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.128699	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.154446	= 0.505521
C = 5.5		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031624	-0.068376	0.019203	-0.080797
0.123175	-0.076825	0.077375	-0.122625
0.260409	-0.039591	0.173098	-0.126902
0.420640	0.020640	0.300745	-0.099255
0.580926	0.080926	0.450166	-0.049834
0.724475	0.124475	0.607734	0.007734
0.841792	0.141792	0.757774	0.057774
0.928340	0.128340	0.883712	0.083712
0.981739	0.081739	0.969178	0.069178
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

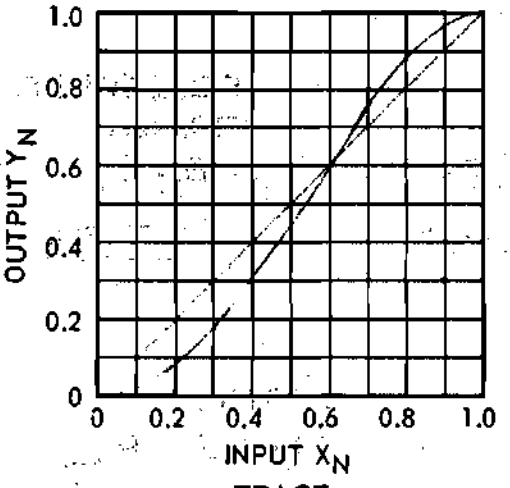


TRACE

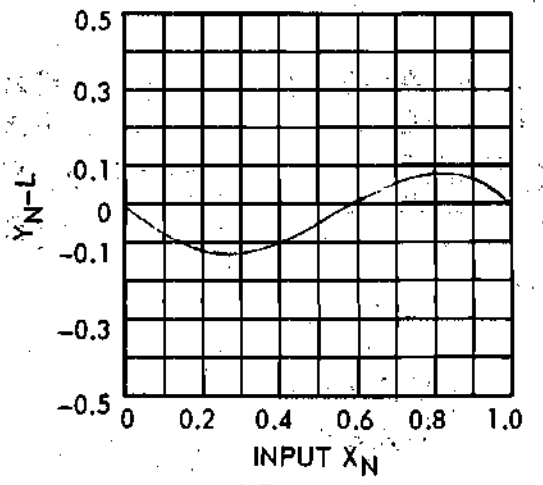


DEVIATION

CRANK RANGE RC1



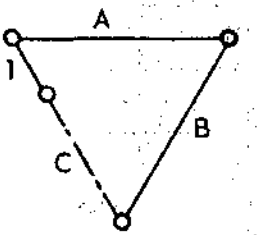
TRACE



DEVIATION

CRANK RANGE RC2

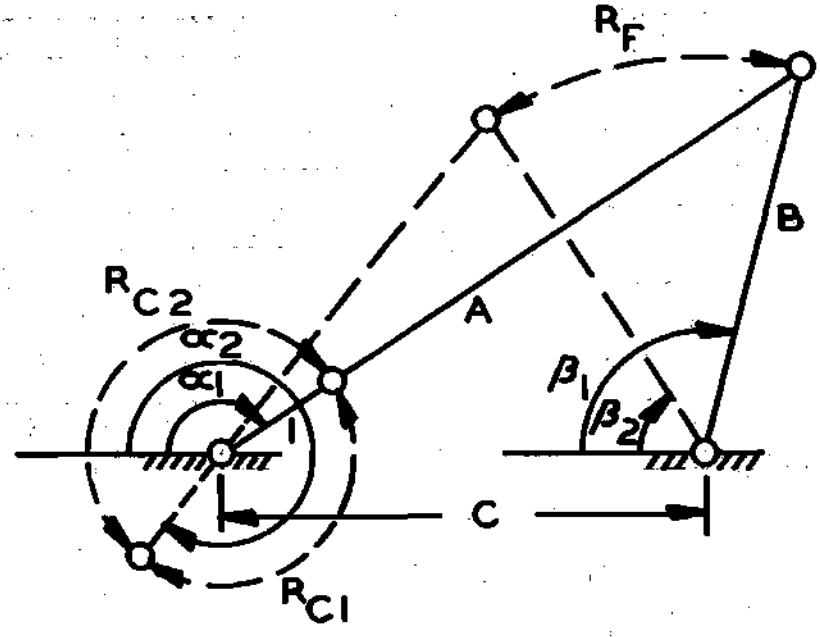
SYNTHESIS OF THE 4–BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

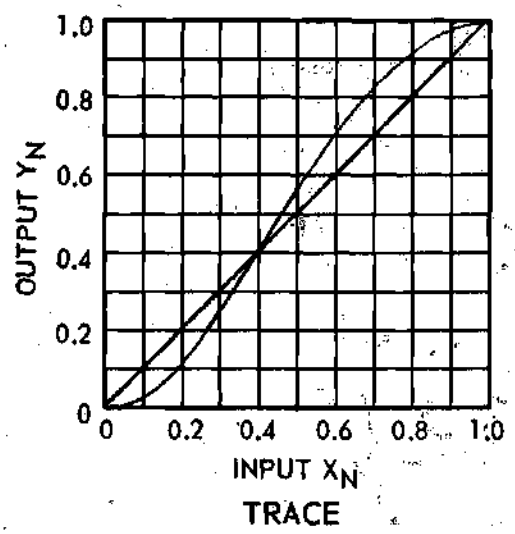
C = 5.5



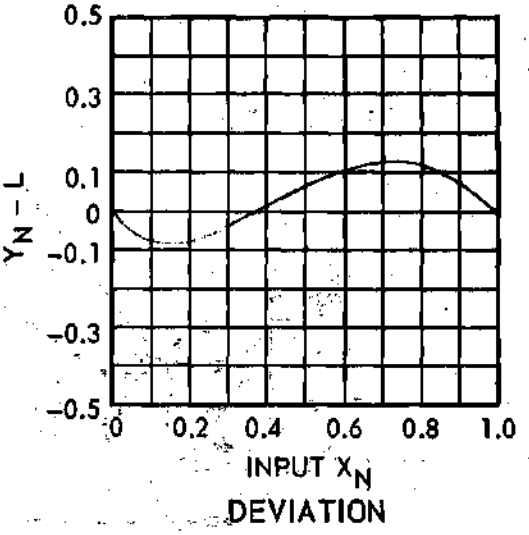
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.230143	$R_F = \beta_1 - \beta_2$
B = 4.0	$R_{C2} = 2\pi - R_{C1} =$ 3.053042	= 0.512896
C = 6.0		

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031876	-0.068124	0.019847	-0.080153
0.122781	-0.077219	0.081032	-0.118968
0.257268	-0.042732	0.182231	-0.117769
0.413312	0.013312	0.315882	-0.084118
0.569929	0.069929	0.469207	-0.030793
0.712112	0.112112	0.626875	0.026875
0.831031	0.131031	0.773114	0.073114
0.921538	0.121538	0.892749	0.092749
0.979470	0.079470	0.971997	0.071997
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

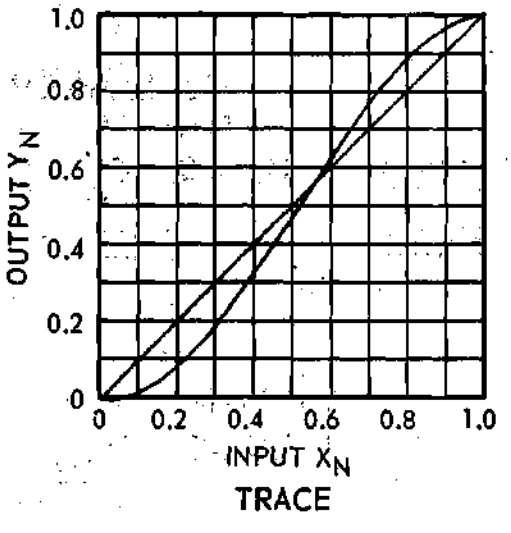


TRACE

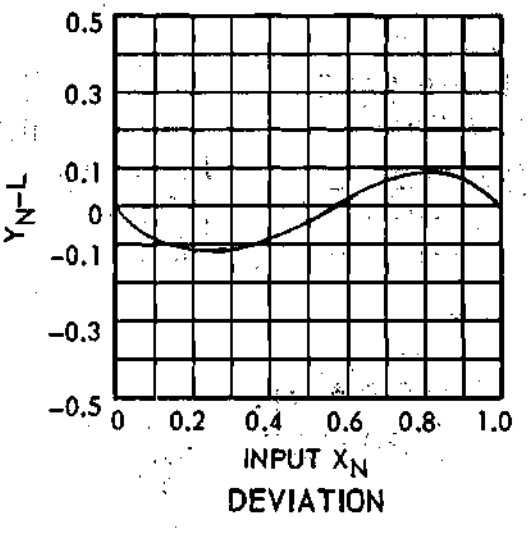


DEVIATION

CRANK RANGE RC1



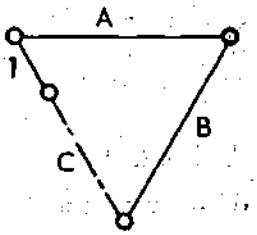
TRACE



DEVIATION

CRANK RANGE RC2

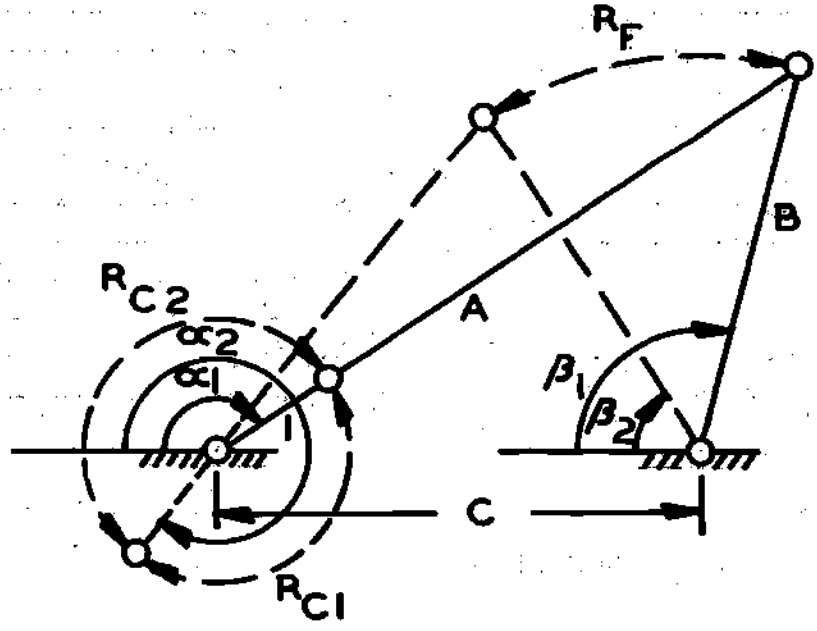
SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

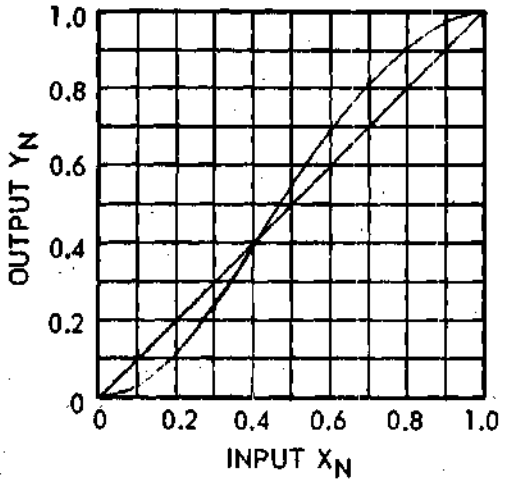
C = 6.0



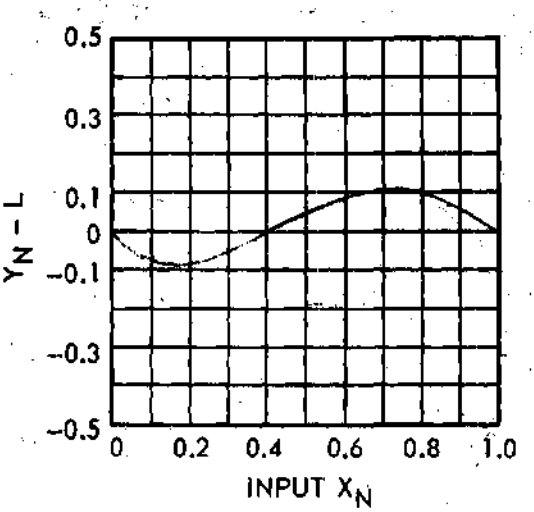
LINKAGE RATIO	CRANK RANGE	FOLLOWER RANGE
A = 4.0	$R_{C1} = \alpha_2 - \alpha_1 =$ 3.361964	$R_F = \beta_1 - \beta_2$
B = 4.0		= 0.550376
C = 6.5	$R_{C2} = 2\pi - R_{C1} =$ 2.921221	

CRANK RANGE R_{C1}		CRANK RANGE R_{C2}	
Y_{N1}	DEVIATION	Y_{N2}	DEVIATION
0.031542	-0.068458	0.022309	-0.077691
0.120105	-0.079895	0.092274	-0.107726
0.249454	-0.050546	0.206197	-0.093803
0.398832	-0.001168	0.350375	-0.049625
0.549812	0.049812	0.507455	0.007455
0.689761	0.089761	0.661332	0.061332
0.811080	0.111080	0.798237	0.098237
0.908302	0.108302	0.906386	0.106386
0.974781	0.074781	0.975958	0.075958
1.000000	0.000000	1.000000	0.000000

All angles measured in radians.

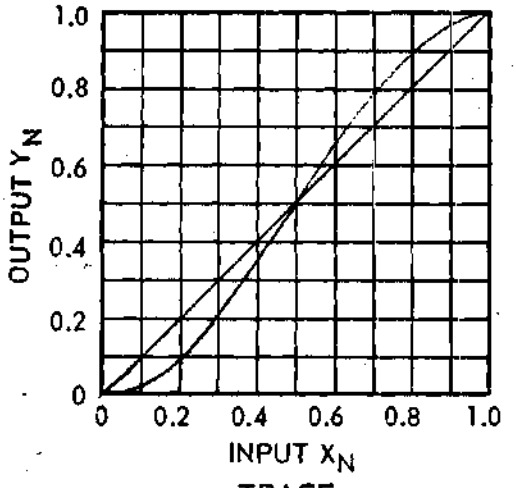


TRACE

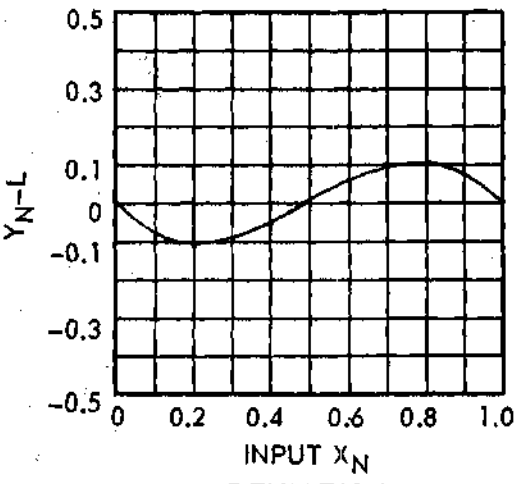


DEVIATION

CRANK RANGE RC1



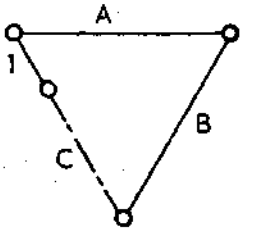
TRACE



DEVIATION

CRANK RANGE RC2

SYNTHESIS OF THE 4-BAR LINKAGE
CRANK AND ROCKER CLASS



A = 4.0

B = 4.0

C = 6.5

BIBLIOGRAPHY

1. Schaffer, B. W. and I. Cochin, "Synthesis of 4-Bar Mechanisms when the Position of Two Members is Prescribed," Transactions, American Society of Mechanical Engineers, vol. 76 (1954), p. 147.

2. Svoboda, A., Computing Mechanisms and Linkages, Massachusetts Institute of Technology Radiation Laboratory Series, vol. 27, McGraw-Hill Book Company, Inc., New York, N. Y. (1948).

3. Freudenstein, Ferdinand, "Approximate Synthesis of 4-Bar Linkages," Transactions, American Society of Mechanical Engineers, vol. 77 (1955), pp. 853-861.

4. Chiang, Chun Hung, "A Semi-Graphical Solution of Acceleration Problems of Plane Can-Driven Roller Followers and 4-Bar Linkages," American Society of Mechanical Engineers Fall meeting (1954), paper no. 54-F-15.

5. Grodzinski, Paul and Ewen McEwen, "Link Mechanisms in Modern Kinematics," Proceedings of the Institute of Mechanical Engineers, vol. 168, no. 37 (1954).

6. Dunk, Allen C., "Designing 4-Bar Linkages," Machine Design, vol. 27 (February 1955), pp. 195-199.

7. Kenngott, Robert L., "Atlas of Curves Classifying Bar Linkages," Unpublished work, General Precision Laboratory, Inc., Pleasantville, N. Y.

8. Hrones, J. A. and G. L. Nelson, Analysis of the 4-Bar Linkage, John Wiley Company and MIT Press, (1951).